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The First Paper Devoted to the Production of Non-Metallic Minerals

XXI | JANUARY 14, 1931 | No. 8

John Wunder Corporation Recommends Hum-mer Screens . . .

"The four 4′ x 7′ Single Body Tandem Hum-mer Screens have been in use all of this season. They have given a splendid account of themselves, handling good tonnages without the plant ever being shut down due to inability of the screens to perform properly.

The two upper Hum-mers equipped with $\frac{7}{32}''$ opening Ty-loy wire cloth have each taken, at times, as high as 150 tons per hour of minus 1″ sand and gravel and made an accurate grading.

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Yours very truly,
(Signed) JOHN WUNDER CORPORATION."
Minneapolis, Minnesota

The W. S. Tyler Company
Cleveland, Ohio

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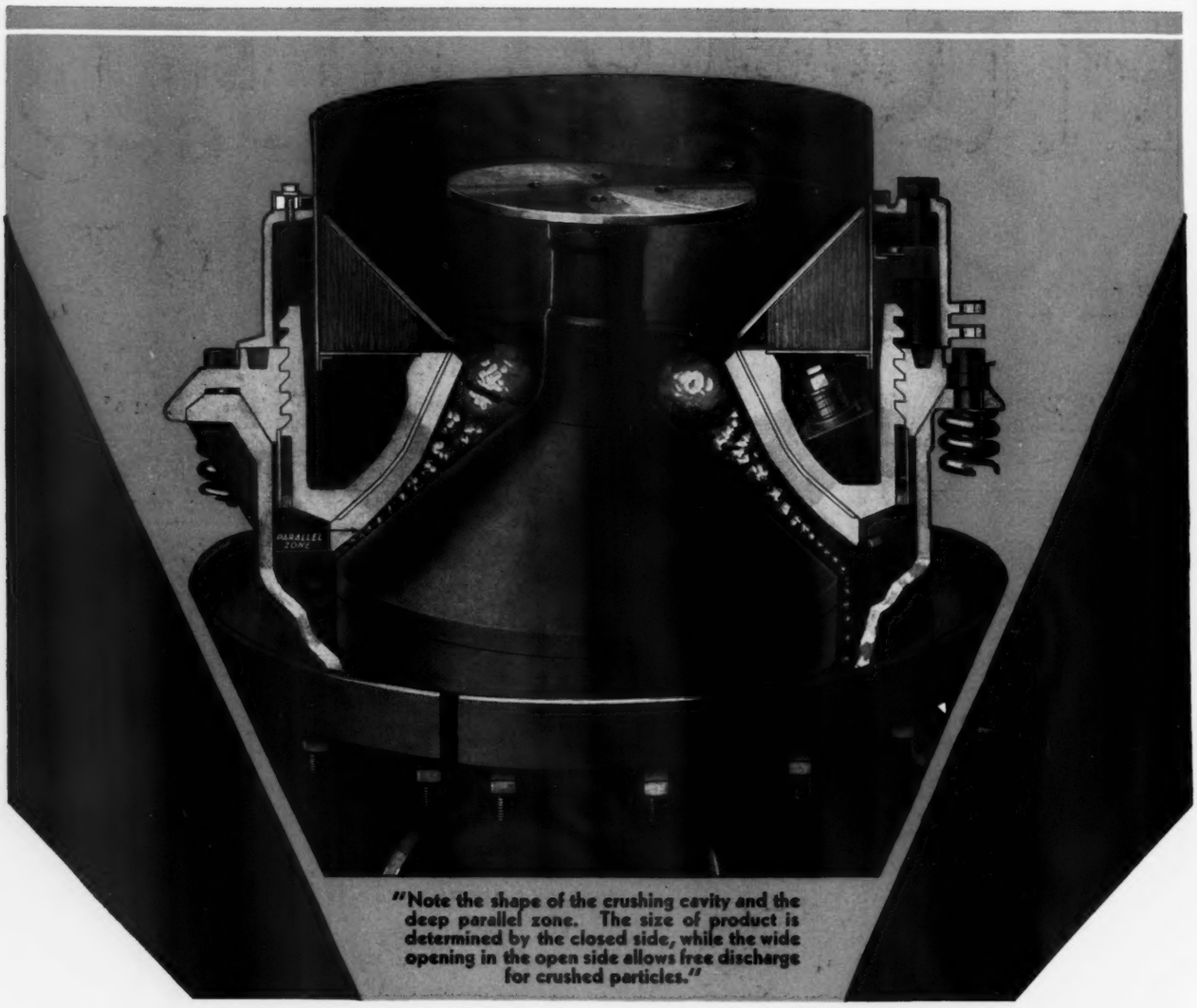

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9. All wearing parts lubricated by an ample flow of oil under pressure.

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These are features that should be considered when choosing your next Crusher.

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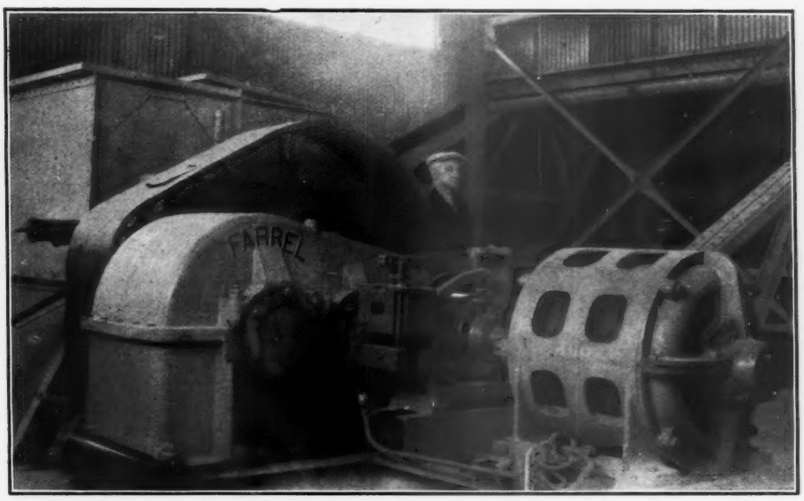

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Published bi-weekly on Wednesday for producers and manufacturers of Sand, Gravel, Stone, Cement, Lime, Gypsum and other non-metallic minerals. Entered as second-class matter October 9, 1928, at the Postoffice at Chicago, Ill., under the Act of March 3, 1879.

Copyright, 1930, by
COMPLETE SERVICE PUBLISHING CO.
538 South Clark St.
Chicago, Ill.

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Subscription price: $5 for 3 years, $2 for 1 year in the United States and possessions, North, Central, and South America; elsewhere $1 additional for each year. Single copies 20 cents.

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Vol. XXI CHICAGO, JANUARY 14, 1931 No. 8

Sand-and-Gravel Men Assemble Jan. 27-29

CONVENTION PROGRAM OUTLINED

The last week of this month—January—will prove memorable to members of the National Sand & Gravel Assn., who will spend three days in reviewing the activities within their industry, in "reuning," and in preparations for another year's developments.

The general convention committee comprises C. G. Besch, Otto S. Conrades and George Ratermann. All sessions will be held in Jefferson Hotel, St. Louis, Mo. Registration will begin Tuesday, Jan. 27, at 9 a.m., and the first session will be called to order at 10 o'clock, with Pres. Robert J. Potts, presiding. Following his opening address, the mayor of St. Louis, Victor J. Miller, will welcome the association, and Executive Secretary V. P. Ahearn will explain the features to be presented on the convention program.

"The Trade Association—A Business Asset," is the title of an address to be delivered by Wm. M. Kinney, general manager, Portland Cement Assn., Chicago, Ill.

"The Next Six Months" is to be the topic of an address by George E. MacIlwain, Boston, Mass.

The noon recess will be devoted to a luncheon of producers and exhibitors.

The Tuesday afternoon program has been arranged for superintendents and operating men, in conjunction with members of the Manufacturers' Division. F. A. Bingham and M. B. Garber will preside. The program:

Dredging Methods and Costs of the Ohio River Sand Co., Louisville, Ky.—J. H. Duffy.
Discussion of dredging operations.
Mining Methods and Costs of the Menantico Sand & Gravel Co., Millville, N. J.—Hugh Haddow, Jr.
Discussion of pumping operations.
Operations of the Northern Gravel Co., West Bend, Wis.—F. A. Bingham.
Discussion of bank operations.

The morning session of Wednesday, Jan. 28, will be in charge of H. V. Owens, with the following program:

Effect of Size and Grading of Coarse Aggregate on the Strength of Concrete—Stanton Walker.
Utilization of Finer Sizes of Gravel in Concrete Highway Construction—Bert Myers, engineer, Iowa State Highway Commission.
The Use of Separated Sizes in the Proportioning of Concrete for Highway Construction—R. W. Crum, director, Highway Research Board, National Research Council.

Discussions of these technical subjects will be led by Alexander Foster, Jr., Warner Co., Philadelphia, Pa., and C. Gray, district manager, American Aggregates Corp., Indianapolis, Ind.

Alexander Foster, Jr., will preside over the following afternoon program, Wednesday, Jan. 28:

Report of Committee on Standard Specifications—Stephan Stepanian, chairman.
Applicability of Sand and Gravel in Correcting Subgrade Soils—F. V. Reagel, engineer, Missouri State Highway Dept.
The Use of Sand and Gravel in Bituminous Work on Rural Highways—H. S. Perry, assistant chief engineer, Ohio Dept. of Highways.
Deleterious Substances in Concrete Aggregates—F. C. Lang, engineer, Minnesota Highway Dept.
Gravel Ballast and Comparative Costs—D. Hubbard, division engineer, Chesapeake & Ohio Ry.
Moving pictures of ballast activities on the Great Northern Ry.

The annual banquet will be held Wednesday evening in the Gold Room of the hotel. Entertainment will be featured. Dancing will follow.

The Thursday morning session will be under the chairmanship of John Prince, and will include the following program features:

The Census of the Sand and Gravel Industry—F. E. Berquist, U. S. Bureau of the Census.
The Value of Safety Work—Ralph Dinsmore, Warner Co., Philadelphia, Pa.
The Function of the Bond in Its Relation to Surety on Materials—A. M. Clark, National Surety Co., New York, N. Y.
Organized Credit Activities in the Building Industry—G. C. Murray, National Builders' Supply Association.
Report of Committee on Uniform Cost Accounting—H. H. Stewart, chairman.
Report of Committee on Cost of Cleaning and Repairing Railroad Cars—J. C. Buckbee, chairman.

President Robert J. Potts will preside over the Thursday afternoon program which will include:

Report of board of directors.
Induction of new officers.
Report of Executive Secretary V. P. Ahearn.
Report of Director Stanton Walker.
The Operation of the District Engineer's Office at St. Louis, by D. D. McGuire, district engineer. Discussion by George Ratermann, Central Building Materials Co., St. Louis, Mo.
Open discussion on Business Affairs of the Sand and Gravel Industry.
Final adjournment.

Special entertainment features have been arranged for the ladies. Luncheon will be enjoyed, Tuesday, at the Glen Echo Country Club, followed by bridge or other card games.

Tuesday forenoon the ladies will be escorted through the newspaper plant of the *St. Louis Post-Dispatch*. Luncheon will be at the Castilla. An afternoon bus trip will include the Museum, municipal amphitheater, and the zoo.

Prepare Program for Ready-Mixed Meeting

SESSIONS AT ST. LOUIS JAN. 26

The first annual convention of the National Ready Mixed Concrete Assn. is scheduled for Jan. 26, 1931, in the interval between the conventions of the National Crushed Stone Assn. and the National Sand & Gravel Assn., in which organization membership is held by various members of the concrete association. The two general sessions, the luncheon and the dinner will be held in New Hotel Jefferson, St. Louis, Mo.

The following program has been prepared:

Morning Session

Design of Concrete for Strength, Permeability and Workability—A. T. Goldbeck, director, Bureau of Engineering, Natl. Crushed Stone Assn.
Suggested Strength Specifications—J. L. Shiely, president J. L. Shiely Co., St. Paul, Minn.
Premixed Concrete from the User's Viewpoint—Henry D. Johnson, Jr., designing engineer, Bureau of Bridges, Pittsburgh, Pa.
Yield of Aggregates in the Design of Concrete—Stanton Walker, director, Engineering and Research Div., Natl. Sand and Gravel Assn.

Luncheon

Members of the association will be guests of the General Material Co., St. Louis, Mo.

Afternoon Session

Brief talks will be made by three concrete operators, to be followed by general discussions of suggested subjects.

Dinner

At 7 o'clock, the annual dinner will be served, accompanied and followed by special entertainment features.

The officers for the past year have been: J. E. Burke, Pittsburgh, Pa., president; C. M. Cornell, Boston, Mass., vice-president; H. T. Thomson, St. Louis, Mo., vice-president; R. B. Young, Toronto, Ont., vice-president; J. C. Eakin, Little Rock, Ark, secretary; J. L. Shiely, St. Paul, Minn., treasurer; Alexander Foster, Jr., Philadelphia, Pa., member executive committee. The headquarters of the association are at 27 Barbeau St., Pittsburgh, Pa.

Aetna Portland Cement Purchases Clay Deposit

The Aetna Portland Cement Co. has recently purchased 113 acres of land containing clay deposits near its plant at Essexville, Mich. The consideration was placed at approximately $10,000.

Nearly a Billion for Road Work This Year

BOON TO AGGREGATE PRODUCERS

Estimated expenditures for road building and maintenance in 1931 have been placed at $840,850,000 by the American Road Builders' Assn., following tabulation of results of a questionnaire submitted to the various state highway departments. There is a likelihood, too, that this may be increased to nearly a billion dollars, due to the probability of favorable legislative action on highway expenditures by most of the state governments and Congress during the year.

Several state legislatures will consider road-bond issue proposals early in 1931. Iowa, and possibly others, is considering an increase in the gasoline tax.

The following table gives the expected expenditure of each state, the figure including both construction and maintenance:

State	Amount
Alabama	$ 15,900,000
Arizona	6,500,000
Arkansas	15,000,000
California	30,000,000
Colorado	5,000,000
Connecticut	12,600,000
Delaware	2,200,000
Florida	12,000,000
Georgia	18,000,000
Idaho	5,500,000
Illinois	31,600,000
Indiana	24,000,000
Iowa	30,000,000
Kansas	13,700,000
Kentucky	20,000,000
Louisiana	30,000,000
Maine	13,100,000
Maryland	11,000,000
Massachusetts	20,000,000
Michigan	30,000,000
Minnesota	15,000,000
Mississippi	6,000,000
Missouri	33,500,000
Montana	4,500,000
Nebraska	10,000,000
Nevada	3,000,000
New Hampshire	5,500,000
New Jersey	36,000,000
New Mexico	5,650,000
New York	60,000,000
North Carolina	11,000,000
North Dakota	3,500,000
Ohio	34,000,000
Oklahoma	16,000,000
Oregon	10,000,000
Pennsylvania	60,000,000
Rhode Island	4,300,000
South Carolina	22,500,000
South Dakota	6,000,000
Tennessee	12,000,000
Texas	45,200,000
Utah	4,000,000
Vermont	5,100,000
Virginia	17,000,000
Washington	12,500,000
West Virginia	14,400,000
Wisconsin	33,000,000
Wyoming	5,000,000
Total	$840,850,000

To Erect Modern Gravel Operation Near St. Paul

Formation of the Twin City Sand & Gravel Co. of St. Paul, Minn., with a capital of $200,000 has been announced by Herman C. Wenzel, prominent in St. Paul political affairs.

Other incorporators are: P. G. Speakes, Minneapolis, secretary; Carl E. Speakes, St. Paul, treasurer; Harry E. Speakes, St. Paul, vice-president; and William A. Bergstrom.

The company recently acquired 100 acres of gravel deposits just west of the city limits of Minneapolis, and a contract has been let for a modern washing and screening plant. Operations are expected to start about March 15.

The company is organized as a wholesale producing sand-and-gravel company. The retail sales in Minneapolis will be handled by the P. G. Speakes Co., and in St. Paul by the Speakes Co.

Medusa Cement to Open New Research Laboratory

The Medusa Portland Cement Co. is establishing a research laboratory at its Wampum, Pa., plant with Alan Jackson, chemist of the Bay Bridge, Ohio, plant in charge.

C. G. Miller, who has been chief chemist for the Newaygo Portland Cement Co. (a subsidiary of the Medusa company) since 1913, is being transferred to succeed Mr. Jackson at the Bay Bridge plant. These transfers are effective Feb. 1, 1931.

Arrange Special Train to Crushed-Stone Meet

Arrangements have been completed for a special train on the Pennsylvania Railroad to provide transportation from eastern seaboard territory to the convention of the National Crushed Stone Assn. in St. Louis, Mo. This will be designated at the N. C. S. A. Special. It will leave New York at 3:40 p. m., Jan. 17, and is scheduled to arrive in St. Louis at 5:30 the following day. New England delegates can make a comfortable connection from the Colonial Express at the New York station. A section of the train will start from Washington, D. C., at 3:55 p. m., Jan. 17, connecting with the New York section at Harrisburg, Pa., the same evening.

Birmingham Slag Co. to Rebuild Plant at Ensley

A new tipple and loading plant will be under construction within 30 days at the Ensley, Ala., plant No. 1 of the Birmingham Slag Co. The structures are to be of steel construction, with the improvements costing $50,000 or more.

The new buildings will replace those destroyed by fire recently.

Illinois Lime Plant to Recover Carbon Dioxide

The Crescent Lime & Marble Co. of Pearl City, Ill., has been organized recently to erect and develop a lime plant near Springfield, Ill. Recovery of carbon dioxide for compression into dry ice is also included in the plans.

The plant will cost about $100,000 with equipment, it is declared.

Largest Cement Mill Takes Safety Trophy

PRES. HOOVER MAY MAKE AWARD

The distinction of being the largest cement plant in the country ever to win the annual safety trophy offered by the Portland Cement Assn. was achieved for the year 1930 by the Universal, Pa., plant of the Universal Atlas Cement Co., a subsidiary of the United States Steel Corp. With more than 500 employees and with a producing capacity of nearly 20 million sacks of cement a year, this plant operated throughout 1930 without a single lost-time accident.

Two delegates from the plant and representatives from other companies that won similar trophies are expected to form a party conducted by the association to Washington where President Hoover will be invited to make the awards.

"Temperatures in the kilns of the plant reach almost 3,000 deg., a greater heat than that required to melt steel," said E. D. Barry, superintendent of the plant for the 18 years up to last March and now assistant operating manager of the company. "Heavy grinding and pulverizing machines abound with potential danger for the worker. Yet our modern mechanical safeguards, plus a continuous program of safety education, so protect the employee that there has not been a serious machinery accident in recent years.

"What few injuries occasionally occur are attributable to momentary lack of individual caution. In addition to the perfect score for 1930, we did not have an accident in 1929 after September 3; our safety record is thus continuous for 484 days."

R. L. Slocum is now superintendent of the Universal plant. J. R. Cline is assistant superintendent. Gordon Huth is safety director for the entire company.

Marquette Improvements at Memphis Completed

The Marquette Cement Manufacturing Co. has completed improvements at its Memphis storage and distributing plant which include two 60-ft. storage silos, conveying equipment, packing equipment and rock bins. Cement is brought to Memphis in bulk from the company's plant at Cape Girardeau, Mo., by barges which are hauled by tow boat. The barges have a carrying capacity of about 5,000 bbl. each and are equipped with a Fuller-Kinyon conveying system by which the cement is pumped ashore through a pipe to the storage silos.

The company is now working out plans for construction of a storage and distribution system at Vicksburg, Miss., similar to the one at Memphis.

A. C. I. to Gather at Milwaukee Feb. 23-26

INSTRUCTIVE PAPERS SCHEDULED

As a coincidence, the American Concrete Institute will hold its 27th annual convention in the same city, Milwaukee, as did its predecessor, the National Association of Cement Users, one-quarter century ago. The convention will occupy four days, Feb. 23 to 26, inclusive, with headquarters and sessions in the Shroeder Hotel. A large local committee is making plans that assure an inspiring, instructive meeting. Monday, the first day, will be devoted to registration and to joint sessions with the Wisconsin Concrete Products Assn. and the Concrete Masonry Assn. On Wednesday the Cast Stone Institute will meet and, on Wednesday evening, the Milwaukee Engineering Society will join the Institute in an informal dinner and entertainment.

The various sessions are scheduled, tentatively, as follows:

Tuesday, Feb. 24

2 P. M. First Session

General topic, Admixtures and Workability. Papers will be presented by George A. Smith of Johns-Manville, Inc., Manville, N. J.; Sanford W. Benham, Chicago, Ill.; Inge Lyse, Lehigh University, Bethlehem, Pa.; William R. Johnson, Calderwood, Tenn.; and Prof. G. M. Williams, University of Saskatchewan, Saskatoon, Sask., Can. General discussion.

Extraction of Water from Concrete After Placement—S. C. Hollister, Purdue University, Lafayette, Ind.

Integral Waterproofing of Concrete—C. H. Jumper, Natl. Bureau of Standards, Washington, D. C.

Concreting the Calderwood Tunnel—W. R. Johnson, Purdue University, Lafayette, Ind.

8 P. M. Second Session

Long-time Tests of Concrete—M. O. Whithey, University of Wisconsin, Madison.

Durability of Concrete—A symposium by members of Committee 801.

Permeability of Gravel Concrete—D. H. Pletta, University of South Dakota, Vermilion, and P. J. Norton, University of Wisconsin.

Properties of Mass Concrete—This will be a report for Committee 108 prepared by Raymond E. Davis and G. E. Troxel, University of California, Berkeley.

Design and Control of the Diablo Dam Concrete—Herbert F. Faulkner, asst. city engineer, Seattle, Wash., and R. R. Hubbard, supt. of construction.

Wednesday, Feb. 25

9:30 A. M. Third Session

Shrinkage of Concrete Masonry—W. D. M. Allan, Portland Cement Assn., Chicago, Ill.

Batch Mixing Versus Continuous Mixing—Benjamin Wilk, Detroit, Mich.

Recommended Practice for the Manufacture of Concrete Masonry Units—P. M. Woodworth, chairman, Committee 708.

Possible Revision of Tentative Specifications for Cast Stone—Fred W. Weigel, Knoxville, Tenn., chairman, Committee 704.

Specifications for Concrete Burial Vaults—W. D. M. Allan, chairman, Committee 709.

Use of color in concrete—Report by Committee 408.

2 P. M. Fourth Session

Sizes and Combination of Aggregate for Road Work—J. C. Thee, engineer, Bureau of Public Roads, A. L. Hambrecht, engineer, Wisconsin Highway Commission, and George W. Langley, engineer, Sheboygan County, Wis.

A Consistency Indicator to Control Concrete Mixes on Road Work—E. D. Roberts, Marquette University, Milwaukee, Wis.

Design and Operation of Central-Mixing Plants—Frank I. Ginsberg, New York, N. Y.

Grading of Aggregates on the Job—I. E. Burks, Kenogami, Que., Can., chairman, Committee 205.

7 P. M. Annual dinner, with Milwaukee Engineering Society. Address by President Duff A. Abrams. Presentation of medal for most meritorious paper presented at this convention.

Thursday, Feb. 26

9:30 A. M. Fifth Session

Reinforced Concrete Columns—Report by W. A. Slater, Lehigh University, Bethlehem, Pa., chairman, Committee 105.

Plastic Flow—Raymond E. Davis, chairman, Committee 109.

Design of Hurricane Exposures in Concrete Buildings—Albert Smith, Chicago, Ill., chairman, Committee 308.

Mixing and Placing Concrete in Buildings—Arthur R. Lord, Chicago, Ill., chairman, Committee 502.

Fabricating and Setting Reinforcing Steel—W. F. Zabriskie, Detroit, Mich., chairman, Committee 503.

Specifications for Ready-Mixed Concrete—Miles N. Clair, Boston, Mass., chairman, Committee 504.

Specifications for the Small Job—Arthur R. Lord, chairman, Committee 506.

2 P. M. Sixth Session

Light-Weight Concrete—Discussion of Cinders and Burned Clay, by: Einer Christensen, chairman, Committee 203; George E. McIntyre, chairman, Committee 204; and Frank A. Randall, chairman, Committee 406.

Design and Construction of a Large Reservoir—Arthur B. Morrill, Dept. of Water Supply, Detroit, Mich.

Use of Cement in Bulk—Herbert Coffman, chairman, Committee 607.

Western Feldspar Will Erect New 50-Ton Mill

A 50-ton feldspar plant will be erected in Canon City, Colo., within the next few months by the Western Feldspar Milling Co. of Denver. J. W. Magnuson, president of the company, was in Canon City recently securing a site for the new plant.

The Western Feldspar Co. has built up an extensive trade throughout the nation. The business has expanded sufficiently to warrant the establishment of a new branch mill to take care of the northern and western trade of the concern, according to Mr. Magnuson.

Kansas City Dealer and Producer Effect Merger

Formation of the Peck-Thompson Sand & Material Co. of Kansas City, Mo., a merger of the Peck-Thompson Sand Co. and the Peck-Woolf Cement Co., has been announced by Frank W. Peck, president. The new company began operating Jan. 1, producing river sand and merchandising sand, gravel, cement, lime, plaster and other building materials.

Other officers are Frank C. Peck, and William P. Woolf, vice-president; and H. B. Thompson, secretary.

Quarry Blast Loosens 100,000 Tons of Stone

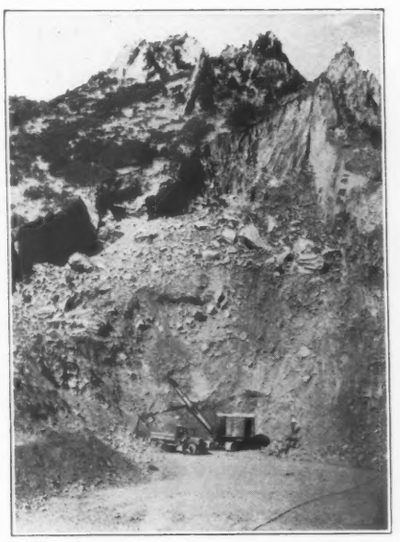
A huge blast, which brought down approximately 100,000 tons of rock was set off in the quarries of the Southwestern Portland Cement Co. recently. The drilling and blasting were under the supervision of A. E. Deegan, engineer of the Giant Powder Co.

Blast Loosens Stone from 250-Foot Face

METHODS USED IN UTAH QUARRY

The accompanying picture shows a portion of the mountainous face in one of the two quarries from which the Portland Cement Co. of Utah produces its raw materials. A Lorain Type L-60 ¾-cu. yd. electric shovel is loading the stone into the single truck that is employed for transporting the raw stone to the quarry crusher. As shown, the shovel has already handled a considerable quantity of the loose rock that was produced by one of the large blasts.

In this case, the face had a maximum height of nearly 250 ft. The holes were so arranged and spaced that the shots would accomplish the



Shovel handling blasted rock in Utah quarry.

mixture of two differing grades of the limestone which here lies in beds that have been tilted until they are nearly on end.

The electric shovel in the picture has been in service since May, 1928, has been in daily operation eight to nine months annually, and has handled an average of 450 tons per shift. The shovel operator has not needed any repair parts other than wire rope and some booster bands which he changes periodically because they become greasy. The manufacturer estimates that the shovel has handled approximately 250,000 tons to date at a power cost not exceeding 4 mills per ton. This is the third Thew shovel that the cement company has purchased.

Salt Plant Near Manistee Sold to Morton Company

The Ruggles & Rademaker Salt Co. plant at Manistee, Mich., was sold to the Morton Salt Co. of Port Huron, Mich., at public sale for $1,450,000 recently. The Morton company took possession December 31.

Quarry Goes 2 Years Without an Accident

SHOWS VALUE OF SAFETY EFFORT

Two years without a single lost-time accident is the exceptional safety record of the Hanover quarry of the Bethlehem Steel Corp., as the year 1930 drew to its close. During the years 1929 and 1930 the number of man-hours worked totaled 476,424. In view of the many hazards in this type of operation, the record of two complete consecutive years with no accidents whatever is regarded as exceptional in industrial centers.

In the two preceding years there were ten lost-time accidents, including one fatality, for a total of 624,421 hours worked.

"The record at Hanover indicates the value of intensive safety effort, even with small operations," said M. L. Jacobs, manager of quarries. "The operation at Hanover is a limited one, with about one hundred persons employed, but the accident situation always comes down to the personal equation and the care of one worker or one hundred workers is just as important as the care of ten thousand. Our accomplishment during the past two years may be credited to the excellent safety program handled by our employees who have their first-aid teams, competitions and first-aid work, and very thorough training in accident-prevention activity."

The system was developed at Hanover with the coöperation of Thomas J. Quigley, chief, Mines & Quarries Section, Dept. of Labor & Industry, State of Pennsylvania, in collaboration with J. E. Culliney, manager of safety for Bethlehem, and C. R. Orndorff, superintendent of the Hanover quarry.

Son of Founder to Head Asano Portland Cement

At a special meeting of the Asano Portland Cement Co., Taijiro Asano was made president to succeed his father, Soichiro Asano, founder of the company, who died recently. At the same time, the second son, Ryozo Asano, was made vice-president of this great Japanese company.

Both sons have been in the United States many times and have attended American universities. They have assumed responsibilities not only in the cement company but in various other Asano enterprises.

To Inspect Laboratories on Second Annual Tour

The Cement Reference Laboratory is arranging for a second tour of inspection of cement-testing laboratories throughout the country. This service, which at present consists of inspecting cement-testing apparatus and demonstrating test methods, is rendered without charge. Laboratories which desire inspection should make prompt application to the Cement Reference Laboratory, U. S. Bureau of Standards, Washington, D. C.

Consolidated Cement Co. Salesmen Hold Meeting

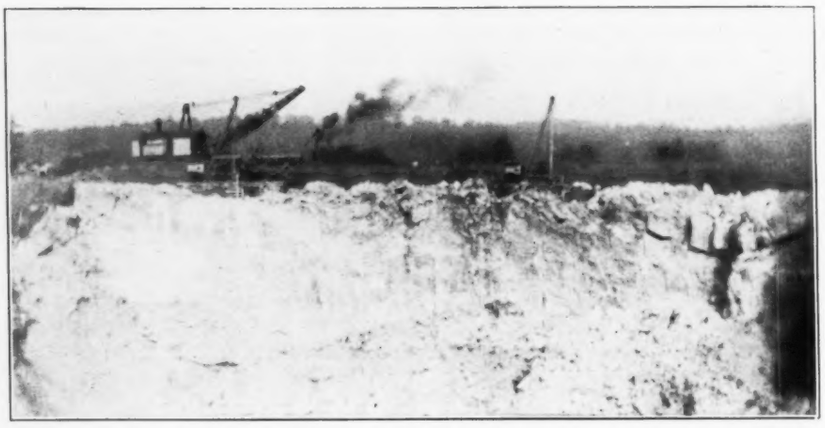
Salesmen of the Consolidated Cement Corp. held their annual meeting at Jackson, Mich., on Jan. 5. The business sessions were held at the corporation's offices in the Carter Bldg., and a luncheon at the Hotel Hayes was a feature of the gathering.

Newaygo Cement Office Now at Manitowoc, Wis.

The Newaygo Portland Cement Co. has announced the removal of its offices, formerly located at Milwaukee, to Manitowoc, Wis.

Hawkeye Will Build Two New Plant Structures

The Hawkeye Portland Cement Co. is beginning improvements at its Earlham, Ia., plant to cost approximately $32,000. A new office building and scale house are to be constructed.



The Hanover quarry, where no accidents have occurred for two years.

Start Now to Insure Spring Work—Affleck

MUCH WINTER PLANNING NEEDED

Announcement of large public-construction programs throughout the country reveals that March, April and May may be made months of work, not of idleness, in the opinion of President B. F. Affleck of the Universal Atlas Cement Co., a subsidiary of the United States Steel Corp. This can be attained, he declared, in hundreds of cases, by arranging, during the winter, all legal and other construction preliminaries.

"There is challenge as well as encouragement in the recent Chamber of Commerce survey report of S. W. Straus & Co., that public improvements valued at $4,500,000,000 are now needed," says Mr. Affleck, "and in the latest *Engineering News-Record* survey indicating that 1931 construction in the same field will approximate $3,250,000,000. The Straus report listed only $1,200,000,000, or less than 30 per cent of the total tabulated, as 'now going forward,' and classified the remainder as 'being held up, delayed or postponed.' Some delays and postponements, of course, are inevitable; but do not the unemployment problem, and the partial remedy within our grasp, constitute a challenge that the preventable portion of delays on 1931 projects be speedily eliminated?"

Winter preparation for spring activity and employment, Mr. Affleck suggested, can often serve both economy and humanity by substituting a dollar's worth of job, and perhaps several dollars' worth of self-respect and satisfaction, for each dollar of relief otherwise needed through the spring.

"In every public construction enterprise, no matter how financed," he said, "there are preliminaries which require weeks or months of attention, which can easily be pushed to completion during the winter. These steps are required by law before work can proceed, yet often they are neglected until spring and thus the period of unemployment and inaction is prolonged. Newspapers, civic bodies and individual citizens can thus be of real help to the unemployed as well as to public officials, wherever they aid in pushing construction preliminaries through during the winter months."

To Erect Storage Silos at Neville Island Plant

Six reinforced-concrete cement silos and a building to house cement pumps will be built at the Neville Island cement plant of the Davidson Coke & Iron Co.

The Rust Engineering Co. of Pittsburgh has the contract for the work. The silos will have a storage capacity of 100,000 barrels.

Editorials

Trade Shows and Association Work

THE present road show at St. Louis lacks some of the interest of its predecessors because of the absence of numerous manufacturers who have supported earlier expositions but are not exhibiting at this one. Notable among these are the power-shovel makers, who, by agreement between themselves, decided not to participate in the 1931 exhibition, but to support the 1932 show instead. Their opinion, held by other manufacturers as well, is that the heavy cost of annual expositions is not justified by the results obtained, whether these be measured in terms of the sales made or by the more or less indefinable standard of contact values. The exhibitor who spends from $5,000 to $20,000 each year on account of an exhibit in an exposition in only one of several fields that use his product may reasonably inquire into the benefits which he derives from participation in it. He may even wonder whether the same amount of money, expended in other directions, might not produce something more concrete than a mere widening of existing acquaintanceship and the enlargement of a good-will that is shared to some extent by all exhibitors. In a year of slackened business activity, this question may too often and too easily be answered in the affirmative.

The doubts concerning the value of trade expositions, so effectually expressed by the manufacturers who determined to hold aloof from the 1931 road show, are not peculiar to shovel makers or, for that matter, to any single industry. They are symptomatic of the increasing tendency to question the utility of trade associations in general and of their annual expositions in particular. The conditions of the past year or two have thrown costs and results into sharper contrast and, in our industry, have precipitated an action which, in more favorable times, might have been long postponed.

The sentiment against annual trade exhibitions, especially in fields wherein engineering developments and style changes do not come and go with every annual turn of the calendar, has grown rapidly in recent years, and in some industries this feeling has shown itself either in a lengthening of the period between successive expositions or in their abandonment. In one conspicuous case, that of the motor-truck industry in which annual exhibitions had been the rule, the increasing cost of participation—not paralleled by a corresponding increase of interest or purchasing on the part of the visitors—led to the abandonment of the national shows, in spite of the fact that the field—comprising some 25,000 dealers and several times as many buyers—was much larger than the fields of many other industries that were supporting industrial expositions. Moreover, it is doubtful if the automobile industry, which has contributed heavily to annual expositions for thirty years, would continue to do so were it not for the custom, almost universal among its members, of announcing new models every year and also for the public's seemingly insatiable curiosity about everything related to motoring. And even here public interest is lagging, due to the industry's apparent inability to sustain it, and each year the industry's national organization is forced to renew its defense against the increasingly numerous complaints of the high costs and relatively small returns of the annual shows.

While engineering developments in the non-metallic mineral industries are not matters of annual occurrence, the technology of the field is rapidly progressing. Indeed, the advance in technique and equipment made in the last fifteen years has been stupendous, and much to the credit for the widespread adoption of these improvements in late years must go to the annual expositions, which have furnished visual evidence of important changes. But there are other and equally strong reasons for the retention of national expositions in this industry. Nothing else is so effective in cementing the disparate and sometimes discordant elements of an industry as a national exposition, because nothing else seems to have the same power of arousing that feeling of industrial solidarity and community of interest which have been such potent factors in the development of our largest national industries. The visitor at an industrial exposition, be he the manufacturer of the product exhibited or the prospective user of it, finds himself a part of an active and enthusiastic gathering of men, who, while they stand in a competitive relationship to each other, have common aims, common problems, common difficulties, and common rivals. This feeling in itself has a strengthening and stabilizing effect on every one who experiences it. It awakens a consciousness of industrial power; it encourages a sense of security through concerted action; it develops pride in the industry's mechanical and commercial attainments; it softens, through a better mutual understanding, the otherwise harsh spirit of suspicion and retaliation that are the inevitable consequences of unbridled competition. However, these advantages alone are not sufficient to sustain a continued interest and confidence in industrial shows at a time when the value of trade-association work is being questioned.

The national crushed-stone and sand-and-gravel associations acted wisely when they agreed with the road-builders' organization in the choice of a common meeting-ground, and their decision showed a thoughtful regard for the financial burden placed on the exhibitors and for the convenience of the many visitors who come from distant places. This action and the unusually high interest of operators, many

of whom have too long deferred much needed improvements and machinery replacements and are, therefore, in a buying mood prodded by necessity, should result in an exceptionally large attendance. In fact, there are indications that the crowds will be large enough to cause some misgivings among absent manufacturers concerning the wisdom of their decision to remain outside. This year may prove to be one of the best of recent years in buyer interest and buyer demand.

But this happy conjunction of circumstances may not occur again and certainly is not likely to be repeated soon, so other means of increasing the buyer's interest and the manufacturer's gain must be studied. The interest of an industry in trade shows must be artificially stimulated and its confidence in trade associations must be won on other grounds, if its industrial organizations are to survive and to render the really useful service of which they are capable when well organized and competently managed. While the annual convention and exposition are powerful means of accomplishing this end, the character of the proceedings is even more important. It is possible, referring specifically to our industries, that more convention papers and discussions should deal with the problems and equipment of production, seeing that the field is rapidly growing in technical knowledge and in the application of technical principles. Striking displays of equipment in action—achieved either through the actual operation of life-sized machines or models, or through the showing of motion-pictures depicting the complete chain of processes from raw-material recovery to finished-product delivery—would certainly be more satisfying to the knowledge-hungry visitor than exhibits of machinery at rest. Illustrated lectures and visits to exemplary plants would add immeasurably to the usefulness of existing trade conventions and would increase in the minds of present and prospective members that feeling of respect for and dependence on association membership which is so hard to develop and so essential to organization success.

By similar methods many successful trade organizations have found it possible to attract and hold the support of the most stable and most useful factors in their industries—the men who are less susceptible to the lures of extra-convention activities than they are to the appeal of the enlightening and constructive forms of association work. At the same time these methods are winning the respect and support of the manufacturing groups, whose financial and moral aid are indispensable to healthy organization growth.

Knowledge and Business Security

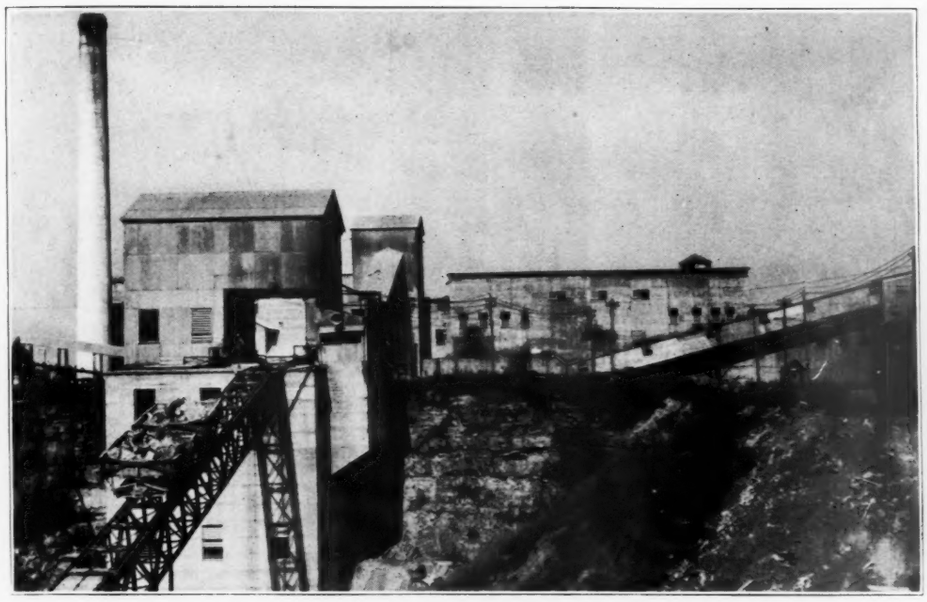
IN the face of uncertainty and seeming instability the human mind turns to whatever appears to offer security and permanence. In a period characterized by extravagant statements, wild guessing, and much deliberate misrepresentation knowledge is at a premium, the facts of experience take on a new importance. At a time when tastes are shifting, when values change from day to day, when prices no longer bear any relation to costs, it is gratifying to find that the appreciation of knowledge not only persists but grows.

The past year has presented the average producer with a multitude of problems touching sales, production, finance, and, in many cases, even existence. Plans have been so hopelessly upset, judgments have been so often wrong, that it has been only too natural to question at times the power of human thought, to look askance at man's oft-repeated boastings of his control of his environment. It is a fine testimony to the soundness of his thinking, however, that, in spite of discouraging conditions that have tried large and small alike, he has not lost faith in the value of knowledge, but that, on the contrary, his desire for facts has indeed been quickened.

Leisure brings to many of us the opportunity for stern self-examination and helpful meditation. To many producers it has offered time for thoughtful consideration of the future of business—its possibilities and its dangers. To many it has brought a realization of the most basic fact of all—that the business which would be permanent and consistently successful must be well fortified, not alone with financial means, but with technical knowledge and efficient mechanical equipment as well. It has brought into much-needed prominence the essential nature of accurate information about every factor in modern business—sources of supply, methods of production, selling possibilities, and business administration.

Book publishers report an increased demand for works on industrial technology and management; librarians have noted a marked increase in the call for serious books; institutions of higher learning can not care for the hordes of applicants seeking specialized training. To these significant evidences of the rapidly growing appreciation of precise knowledge we are able to add testimony specifically applicable to our own industries. We find the demand for practical information on all phases of non-metallic mineral production steadily increasing. In spite of a general tendency to curtail expenses, particularly in directions that do not seem to lead to immediate gain, PIT AND QUARRY'S paid subscribers for the last six months of 1930 exceed those of the first six months of that year. This, like the other facts cited, shows unmistakably a greater desire for and dependence on reliable sources of commercial and technical information.

In our opinion there could be no more favorable sign for the betterment of business in our industries than this growing appreciation of knowledge. We think it foreshadows greater stability for the business of the future; it presages, too, the development of a superior type of producer, to whom success will be less and less a matter of fortuitous circumstance and more and more a question of intelligent planning founded on a firm understanding of underlying causes and the means for their direction and control.



Incline from quarry to crusher building with plant in background.

Supt. E. French

Canada Cement Adapts Plant at Hull to Wet Process of Manufacture

Mill No. 3 of Dominion's Largest Producer Now Has Capacity of 2,600 Barrels Daily

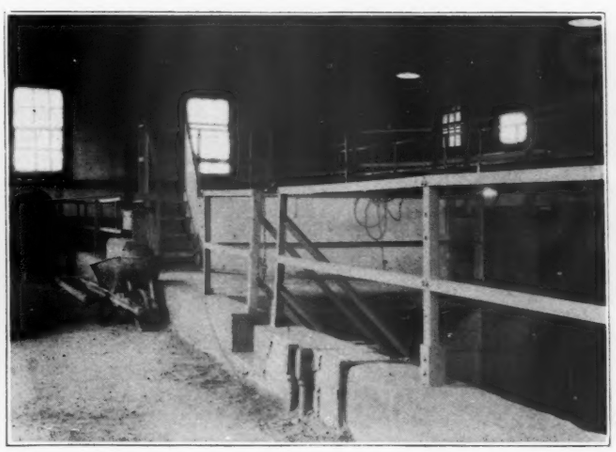
By W. E. TRAUFFER

ABOUT two years ago, Canada's leading manufacturer of Portland cement undertook a program of expansion and improvement which included the conversion of one of its plants from the dry process to the wet process. This refers to the Canada Cement Co. and its No. 3 plant at Hull, Que. The conversion required an almost complete reconstruction of the mill and was made druing the winter of 1928-29, the plant returning to operation in June, 1929. The changes were made under the supervision of S. Barr, chief engineer, and F. B. Kilbourn, general superintendent.

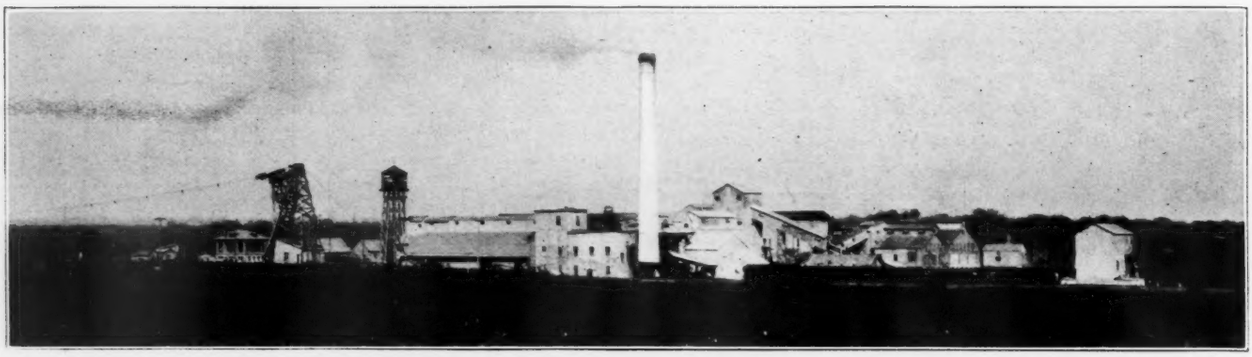
The original plant was built in 1905 and used the dry process. Numerous minor alterations were made from time to time, the last change of importance before the conversion being the construction of a new crushing plant in 1926. No changes were made in the coal mill nor in the finish-grinding mill. The capacity of the plant is now 2,600 bbl. per day.

All of the concrete work, with the exception of the kiln stack, was done by the company's forces. This includes the clay and slurry tanks and all machinery foundations. The kiln and its drive were furnished by the Traylor Engineering & Mfg. Co.

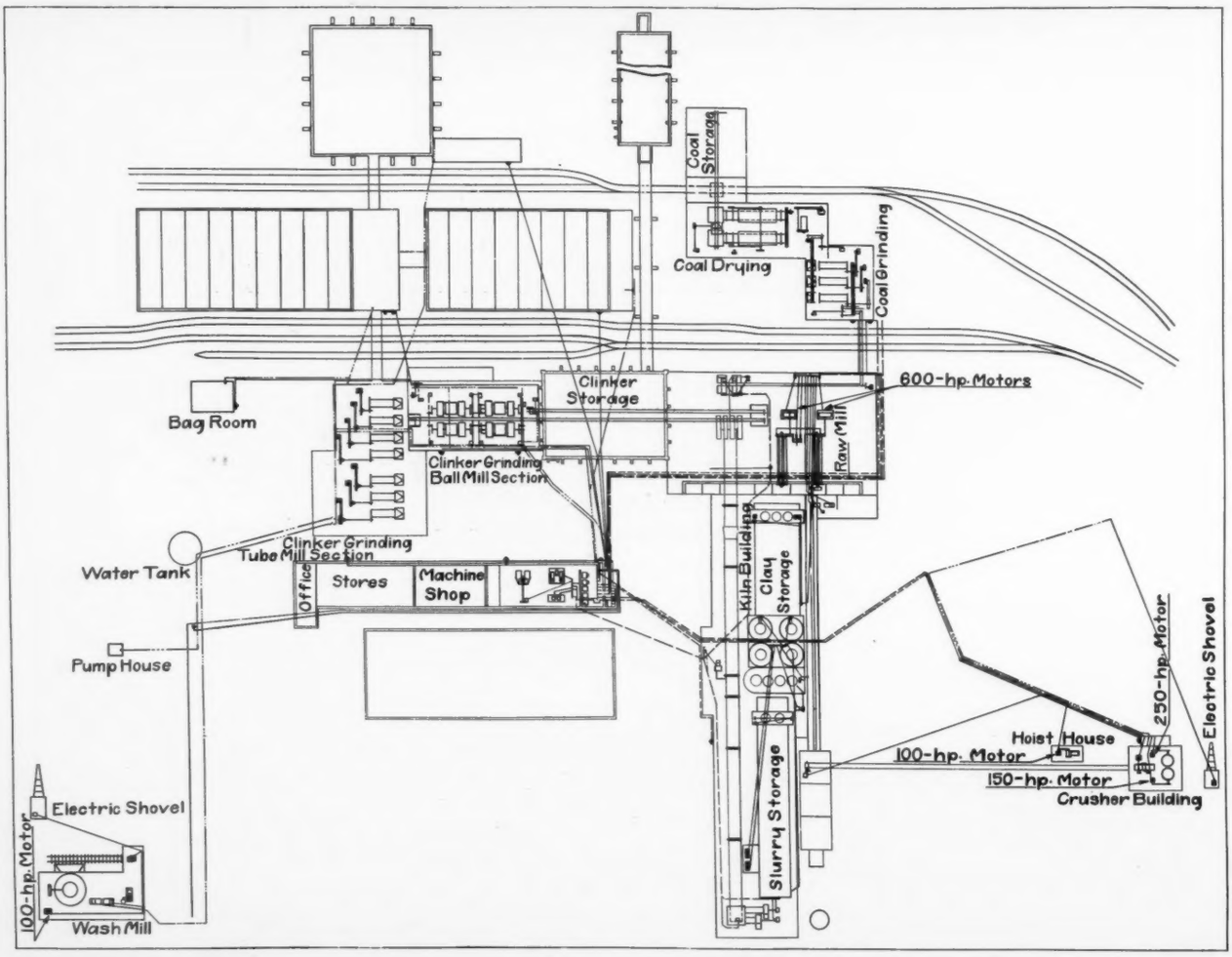
Shovel loading cars in clay pit.



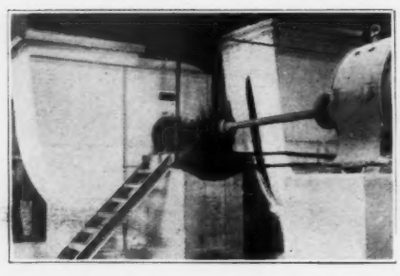
The 26-ft. clay wash-mill with its drive at left.



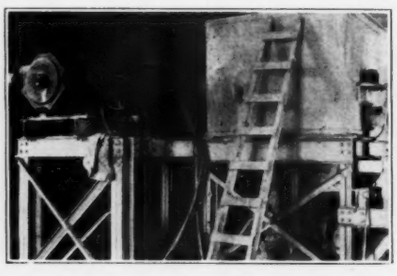
The Hull plant from the southwest with crusher building at right. At the left are the laboratory building and the cableway system formerly used for transporting clay from pit to plant.



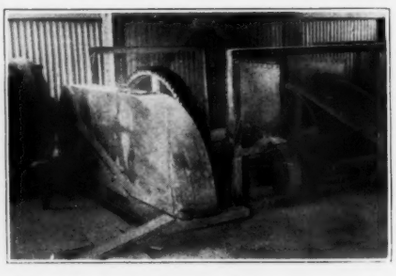
Plan drawing showing layout of Canada Cement Co. plant at Hull, Quebec. Note unusually compact design of raw mill and kiln building.



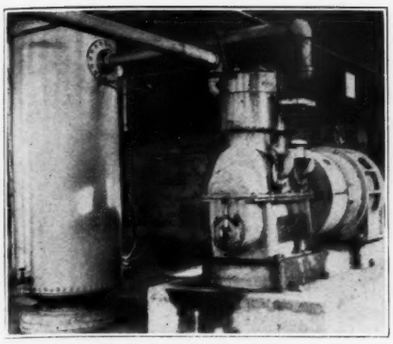
The two large fans which furnish draft for the kiln.



Variable-speed-reducer drive of kiln slurry feeder.



Silent-chain drive of conveyor from crusher building.



Compressor and air receiver for clay-agitator system.

Car of stone being hauled through tunnel to crusher-house.

Tractor hauling ball-mill plates to the plant.

and most of the remainder of the machinery by F. L. Smidth & Co. This includes the clay wash mill, the clay and slurry traveling agitators, the revolving slurry agitators, the slurry feeder, the Unax coolers, the kiln-chain system, dust chamber and seal ring, the two Unidan mills, and the electrical-control system. Most of the electric motors were furnished by the Canadian General Electric Co.

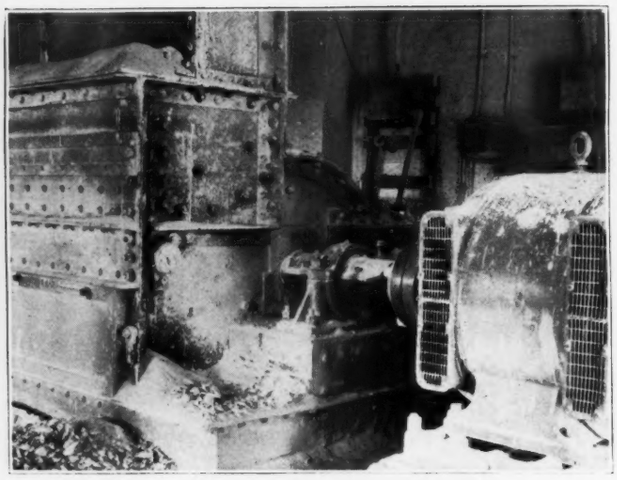
The deposit of raw material owned by the company at this plant consists of about 240 acres of limestone. Tests show that, to a depth of 240 ft., the stone is ideal for cement manufacture. The quarry drilling is done with Loomis 4-in. and 6-in. well drills. Blasting is done with Forcite 40-per cent dynamite made by the Canadian Industries and Cordeau-Bickford fuse. Very little secondary drilling is necessary as most of the large rocks are broken with a cast-steel ball which is dropped by the shovel.

A Model 37 Marion 1¾-cu. yd. electric shovel loads the stone into 12-cu. yd. side-dump cars. These are hauled to the foot of the incline to the crushing plant by a Plymouth 8-ton gasoline locomotive. They are then hauled up this incline, two at a time, and dumped into the Traylor 48-in. by 60-in. jaw crusher. A Jeffrey apron feeder transfers the stone from the crusher into a Pennsylvania SXT8 hammermill. This discharges onto a 30-in. inclined belt conveyor, on 312-ft. centers, which leads to the main plant where the stone is fed to the stone storage of 2,200-ton capacity. The jaw crusher and the hammermill are belt-driven by 300-hp. and 150-hp. motors respectively, while the main belt conveyor is driven by a 50-hp. motor through a Link-Belt silent-chain drive and gear. Goodyear conveyor belting is used.

The crusher building was built in 1926 and is of concrete for the most part, with a structural-steel and corrugated-metal structure over the hopper. A split hopper from the primary crusher formerly fed

Electric shovel loading cars of stone in quarry and 8-ton gasoline locomotive used for quarry haulage.

The 48-in. by 60-in. primary jaw crusher.



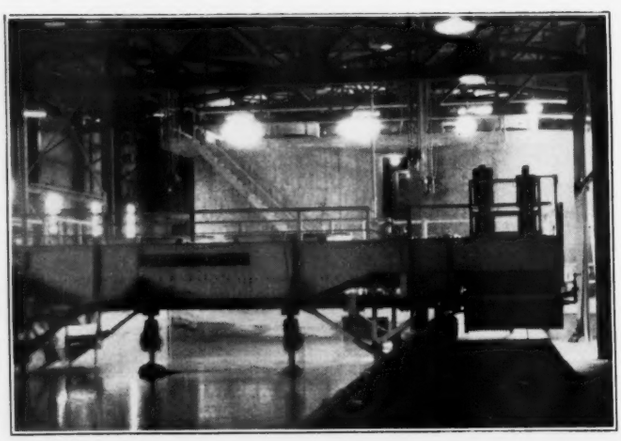
The swing-hammer mill for secondary crushing.

two small gyratory crushers, the stone thus produced being sold to the local market. This practice was discontinued several years ago.

The clay pit is on the opposite side of the plant from the quarry. The clay is uniform in quality, is free of pebbles and breaks down very easily. A Marion Model 7 gasoline-electric shovel loads into 6-cu. yd. cars which are hauled to the clay-wash building by a Plymouth 8-ton gasoline locomotive. Here the clay is dumped through a bar grizzly into a Smidth 26-ft. wash mill which is belt-driven by a 60-hp. motor. The clay slip discharges from the wash mill, through a grating, into a concrete pit. The slip, which has a moisture content of about 75 per cent, is then pumped a distance of about 1,800 ft. to the clay basin at the main plant by two Wilfley 6-in. pumps.

The clay building is of recent construction and has concrete foundations, a structural-steel framework and a stuccoed exterior. In addition to the wash mill it houses an Ingersoll-Rand Imperial Type 20 two-cylinder air compressor which is direct-driven by a 60-hp. motor. A Protectomotor air filter on the intake protects the compressor from undue wear. This compressor furnishes air to blow out the pipe-line to the plant, after the pumps are shut down. A cableway system was used at one time for hauling clay from the pit and another for transporting rock from the quarry to the plant. These have been abandoned, but the towers and cables are standing.

The clay-slip storage tank is 35 ft. wide and 80 ft. long. It is equipped with a Smidth three-paddle traveling agitator. The stone is fed from the storage bin onto a belt conveyor and is carried to feed bins over the two Smidth 7-ft. by 39-ft. Unidan mills which do the raw grinding in one operation. Each of these mills is driven by a 600-hp. motor. The slurry, which has a moisture content of about 40 per cent, discharges to a pit from which two Wilfley pumps feed into four 500-bbl.-capacity con-



Slurry agitator with slurry-blending tanks in background.

The two-paddle traveling slurry agitator.

crete correcting basins. Each basin has a Smidth revolving mechanical and compressed-air agitator. These are driven, in pairs, through Falk speed reducers by 10-hp. motors.

The correcting basins discharge by gravity into a 1,500-bbl.-capacity rectangular concrete mixing basin. This has a Smidth quadruple revolving mechanical and compressed-air agitator which is driven, through a Falk speed reducer, by a 20-hp. motor.

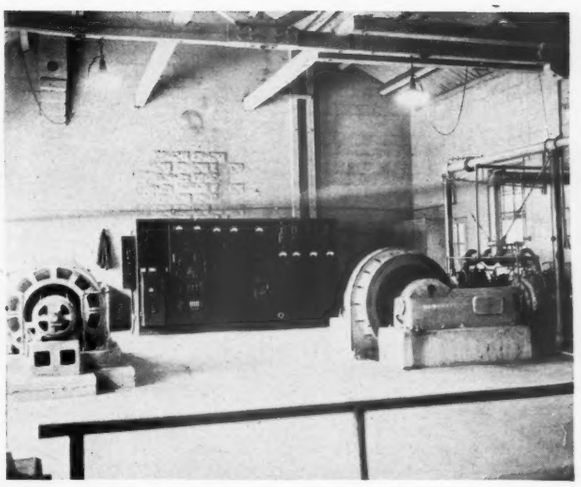
The mixing basin overflows into a rectangular concrete storage basin 25 ft. wide by 135 ft. long. This basin is equipped with a Smidth two-paddle traveling agitator. Two Wilfley pumps feed the slurry from this basin to the Smidth Ferris-wheel

kiln feeder which discharges, by gravity, into the kiln. Merco-Nordstrom valves are used on all slurry and clay-slip lines.

The Traylor 365-ft. kiln is 10 ft. in diameter except for 100 ft. at the burning end where it is 11 ft. 3 in. in diameter and has six supports. A Smidth 90-ft. chain section at the feed end breaks up the slurry to give a more thorough and even burning. A 9-ft. dead extension at the burning end of the kiln provides for the Smidth Unax ten-section, single-row cooler. This kiln is the largest in Canada and one of the largest in existence. It is driven by a 125-hp. motor through a Traylor gear reducer. On the drive shaft of this motor is a generator which furnishes current for the 15-hp. d.c. motor which drives the slurry feeder through a

The three-paddle traveling clay-slip agitator.

Cleveland worm-gear speed reducer and a Stephens-Adamson J F S variable-speed reducer. This arrangement assures a constant ratio between the speed of the kiln and of the feeder, and allows the ratio to be changed as desired. A Buda 42-hp., 4-cyl. gasoline engine is installed as an auxiliary—in case of power failure—and can drive the kiln by chain through the high-speed shaft of the gear reducer.

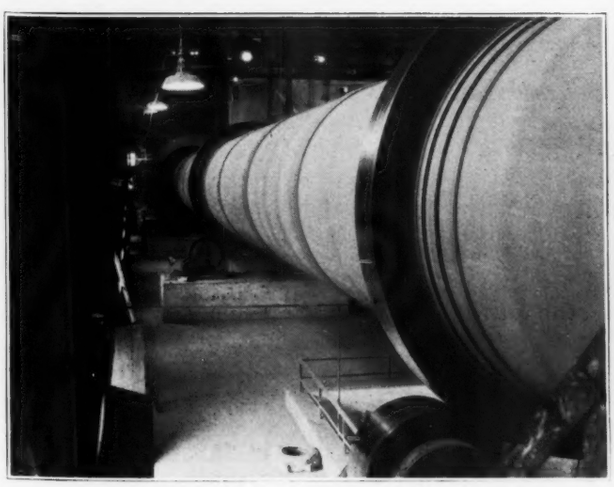


The compressor room showing one of the compressors, a generator and the switchboard.

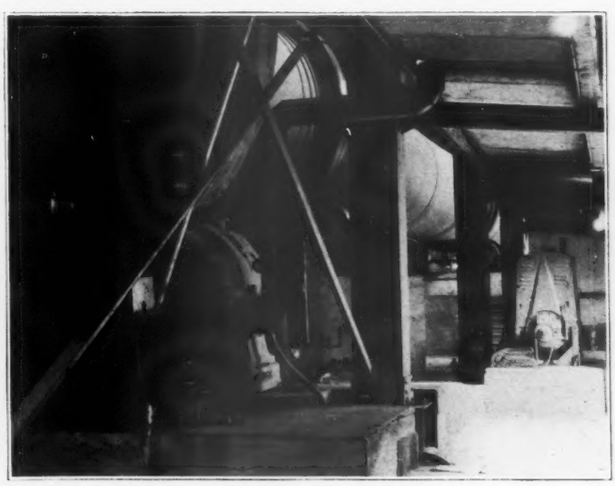
The kiln has a Smidth seal ring at the feed end. Draft is furnished by two Canadian Blower & Forge Co. fans, each of which is driven by a 60-hp. motor. The 150-ft. reinforced concrete stack was built by the Heine Chimney Co. and is 9 ft. 6 in. in diameter at the top. The draft-control board has a Bailey fluid meter, an Ellison inclined draft-gauge, and the fan-motor controls.

The Unax cooler discharges onto two 24-in. by 18-in. McCaslin conveyors, one of which is used as an auxiliary. These carry the clinker to the roofed but open clinker storage. One of these conveyors extends through a tunnel under the clinker-storage building and carries the cooled clinker to the finish mill-feed tanks. Gypsum, which is shipped in by water and rail from Nova Scotia, is fed by a rocker feeder from the storage onto the same McCaslin conveyor that handles the clinker.

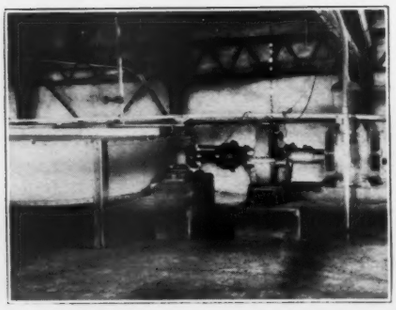
Preliminary finish grinding is done in eight No. 8 Krupp mills. Screw conveyors and elevators feed the material from these mills to seven 5-ft. by 22-ft. two-compartment mills which do the final grinding. Screw conveyors and elevators feed the finished cement to three stock-houses with a capacity of 250,000 bbl. More conveyors and elevators carry the cement from storage to the new pack-house which



The 365-ft. kiln with some of the slurry tanks in background.



The kiln drive with auxiliary gasoline engine at right.



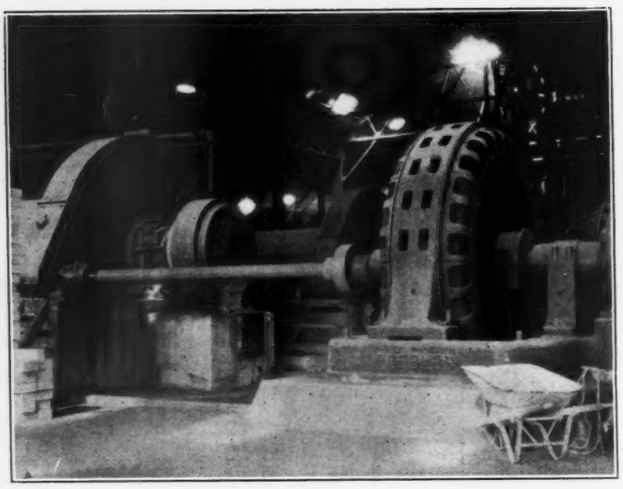
Speed-reducer drive of the slurry-blending-tank agitators.

The two pumps which handle slurry from storage to kiln.

The kiln-draft-control board with fluid-meter and draft-gauge at left.

contains six Bates three-bag packers. These feed, by a belt conveyor, to their cars or trucks, most shipping being done by rail.

The nature of the raw material at this plant is such as to permit a rather wide variation in the



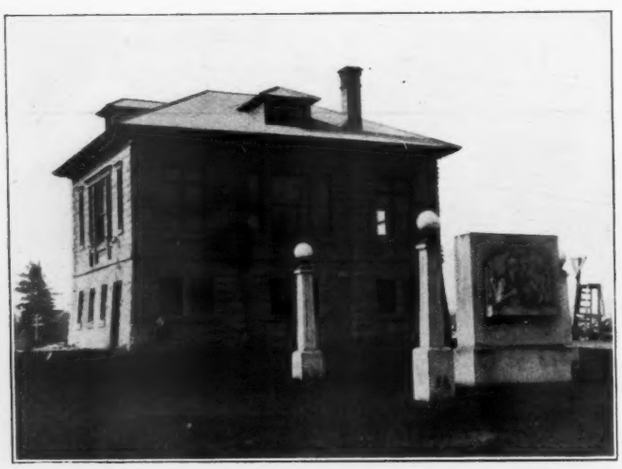
A 600-hp. synchronous motor driving one of the raw-grinding compartment mills.

composition of the cement without causing a trace of unsoundness or decrease in strength. Since the new large kiln was installed there has been no trouble with clinker rings. To insure against their formation, however, about 2 per cent of silica sand is added on the rock belt before feeding the material to the Unidan mills. This sand is procured on the company's own property. Typical analyses of the cement produced and its various components are given below.

	Limestone	Clay	Mix	Clinker	Cement
SiO_2	6.02	53.84	13.88	.....	21.07
R_2O_3	1.22	27.07	5.68	.....	9.22
CaO	50.27	4.27	42.60	64.95	63.78
MgO	1.67	.....	2.31	.....	2.96
SO_3	.....	.....	.....	.....	1.68
Loss on ignition	.....	.....	34.95	.....	0.89

A Caterpillar 30 tractor is used for general work about the plant and for stripping.

The laboratory staff consists of C. G. Carter, chemist; R. F. Haskett, assistant chemist; and three assistants. The chemical and physical laboratories are housed in a neat stone building. E. French is superintendent of the plant.



The laboratory building with the plant safety trophy in the foreground.

Attendance at National Power Show Breaks Previous Records

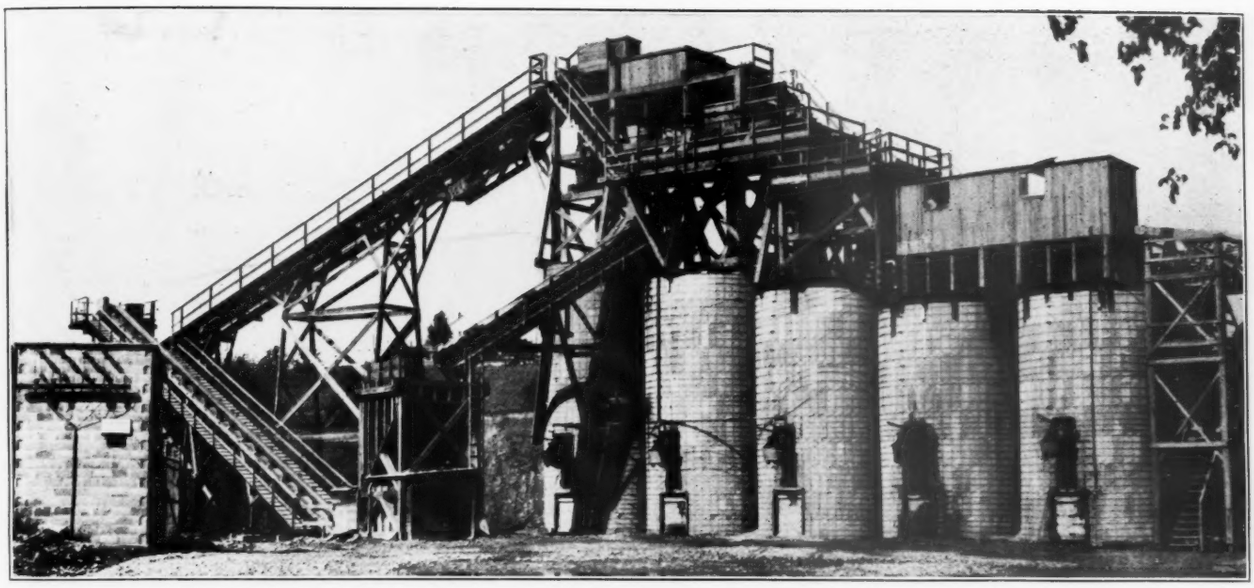
The national power show held at the Grand Central Palace from December 1 to 6 contained more than four hundred exhibits from all parts of the United States and drew a crowd of over 130,000 visitors. All attendance records were thus broken and the character of the visitors was much more valuable from a sales standpoint than ever before.

Power is the basic factor in America's civilization and there was no glint of a depression in the enthusiasm and activity exhibited at the Show. Firms supplying the power plant field evidently realized that this was their opportunity to show real leadership by demonstrating to industry, through carefully designed working exhibits, the devices which produce efficiency and economy and go far toward curing some of the economic evils of waste.

Plan Exposition of Raw Materials at Chemical Industries Exhibit

During the week of May 4 to 9, 1931, inclusive, the thirteenth exposition of chemical industries will be held at the Grand Central Palace, New York.

The exposition will include three floors of exhibits devoted to the raw materials suitable for the manufacture of chemicals and chemical products, various other technical products used in the arts and industries, apparatus and equipment, machinery, and the finished products of the chemical industries.



The C. A. Heyl plant showing screening tower and storage bins.

Ohio Operator Completes New Plant to Supply Local Building Trade

Sand and Gravel Output Transported to Jobs Exclusively by Motor Truck

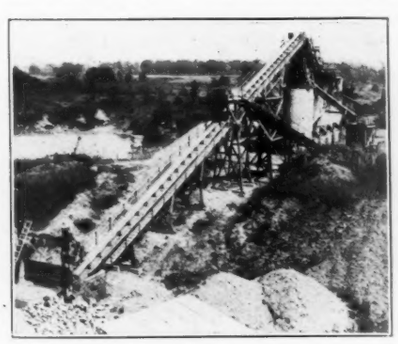
A NEW sand-and-gravel plant with some interesting features was put into operation early in May, 1930, at Barberton, O. It is located on the west limits of that city and furnishes material for local construction and paving work. All shipments are made by truck. The plant, exclusive of the silos, was designed by the Day & Maddock Co., of Cleveland, O., and has a capacity of 75 cu. yd. per hour. It is operated by C. A. Heyl, although owned by the firm of Stuver Bros. Co.

The deposit is high grade with a content of about 80 per cent sand and 20 per cent gravel. It is a short distance from an old pit and plant which had been operated for five years by Mr. Heyl, who moved some of his equipment into this new plant and abandoned the old one.

The sand and gravel are taken from the pit by a Sauerman Crescent ¾-cu. yd. power drag scraper. This is operated by a Thomas 2-drum hoist, through a Link-Belt silent-chain drive, by a 60-hp. Thomas motor in a neat frame building from which the hoist engineer can see all operations. The scraper discharges through a rail grizzly with 7-in. spacing into a 15-ton-capacity hopper. A Stephens-Adamson feeder discharges from this hopper onto a 24-in. belt conveyor, on 200-ft. centers, which carries the material to the top of the screening building. This conveyor is driven by a General Electric 15-hp. motor through a gear drive. Goodyear Style W conveyor belting is used.

The conveyor discharges to a series of revolving screens. The first is an 84-in. scrubber screen with 2½-in. perforations. The oversize from this screen is chuted to a surge box feeding an Iowa Mfg. Co.

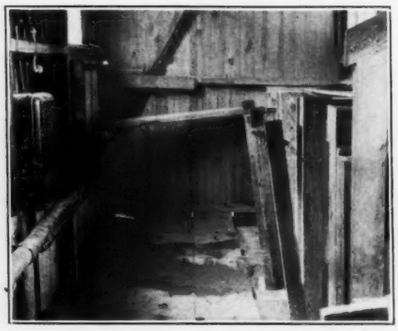
Dredging unit which removes silt from pond.



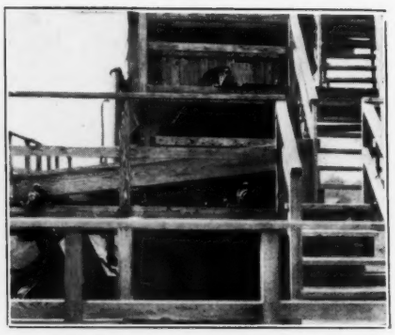
The plant viewed from brink of the deposit.

Looking down main conveyor incline to pit.

Truck loading at bins. Note rinsing spout.



Levers operating sand-settling box at right.

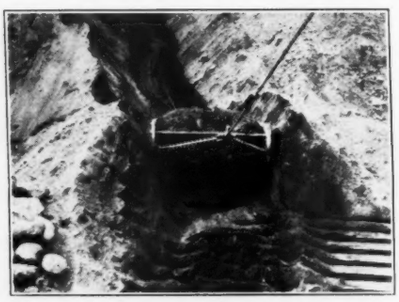


End view of plant showing the screen drives.

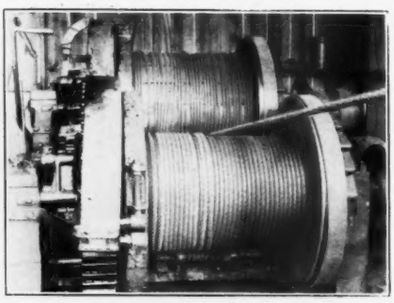
8-in. by 36-in. jaw crusher. This crusher discharges the stone onto a 20-in. inclined belt conveyor, on 100-ft. centers, which feeds back onto the main conveyor which leads to the screening building. The crusher is belt-driven by a General Electric 25-hp. motor and the return conveyor by a 5-hp. motor of the same make. Stephens-Adamson Saco conveyor belting is used.

The material passing through the scrubber screen feeds to a series of four Stephens-Adamson Gilbert 6-ft. revolving screens. The first has 1¼-in. and the second ⅝-in. perforations. The last two, which are side by side and are fed through a split chute, have 5/16-in. perforations. All five screens are chain-driven from the same Allis-Chalmers 20-hp. motor.

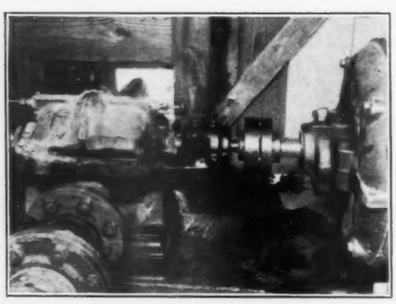
The three sizes of gravel produced are chuted directly into three of the five Neff & Fry concrete-stave silo-type bins which support the screening plant. These bins are each 14 ft. in diameter. The material passing through the 5/16-in. screens goes to two wooden sand-settling boxes which produce two grades of sand. Each box discharges through three manual, lever-controlled gates into one of the two smaller bins.



Drag-scraper discharging to hopper over grizzly.



The 2-drum hoist which operates the drag-scraper.



Pump and motor which supply the water for washing.

The waste water and silt are flumed into a nearby pond. Each of the five bins has a Good Roads single cut-off gate on each side for loading into trucks. Wash-water for the plant is furnished from this pond at a safe distance from the flume discharge by an Allis-Chalmers 5-in. by 6-in. single-stage, centrifugal pump driven by a 60-hp. motor of the same make. Sprays wash the gravel in the scrubber and in each sizing screen, and the gravel is given a final rinse over a perforated screen at each bin gate.

The pond is fed by springs and, to keep these from being covered up by the silt from the plant, a small dredging unit is used. This con-

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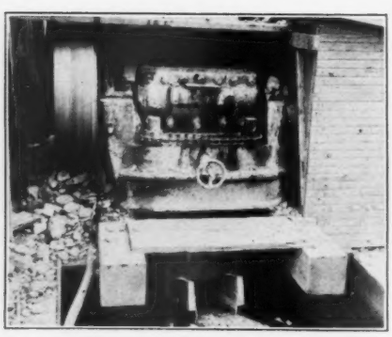
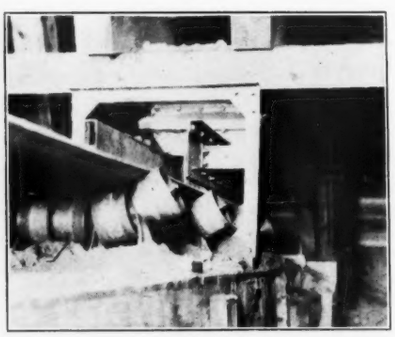


Jaw crusher discharging to return conveyor.

Conical scrubber screen used in the plant.



Feeder under pit hopper feeding plant conveyor.

Bureau of Mines Gave 112,000 Workers First-Aid Training During Year

MORE than 112,000 employees of the mining, quarrying, metallurgical, oil and gas, and allied industries were trained in first-aid or mine-rescue methods during the fiscal year ended June 30, 1930, says Scott Turner, Director of the U. S. Bureau of Mines, in his annual report to the Secretary of Commerce. The number surpasses by 31,000 that attained in any previous year, bringing the total number so trained by the Bureau since its establishment to approximately 480,000. Many large mining concerns are manifesting their interest in this work by having these courses given to their entire working force, and during the year 181 mines or plants were given bureau certificates showing that one hundred per cent of their employees had been trained.

The Bureau of Mines continued to make steady progress with its general educational program looking toward the attainment of safer and more healthful working conditions among the employees of the Nation's mineral industries.

Continued widespread interest was manifested by the mining industry in the numerous reports on mining and milling methods and costs issued by the bureau. These reports present detailed data regarding conditions at representative operations in the various mining districts, and are designed to assist the operators in the solution of their economic problems. This work was extended during the year to the non-metallic industries.

Considerable attention is being given to problems in the mining, treatment and utilization of the numerous important nonmetallic minerals used to an enormous extent in general construction and engineering enterprises. Special attention was given to the problems affecting the phosphate, kaolin, mica, and ocher industries. New processes devised for the utilization for fertilizer purposes of polyhalite, found in large quantities in New Mexico and Texas in the Bureau's potash exploration program, give promise of success.

In addition to studying the scientific and technical problems of the mineral industries, the Bureau is giving increased attention to economic conditions and problems. This involves the collection and dissemination of statistical data regarding the production, consumption, distribution, and storage of the numerous essential minerals. The results of these statistical and economic studies are widely used by the mineral industries in keeping in close touch with market trends and in the solution of business problems.

Accidents to the men employed in the mineral industries of the country result annually in approximately 2,800 deaths and more than 200,000 lost-time injuries. The economics branch conducts statistical canvasses of the number and causes of accidents to persons employed in these industries. Information of this nature is essential to the study of effective means of accident prevention.

The mining and allied industries are now apparently well on their way to adoption of the viewpoint that the first-aid training of the entire personnel is not only humanitarian, but in addition has definite value in the saving of dollars and cents. During the year 181 mines or plants identified with mining in some form, were given the Bureau of Mines 100 per cent certificates, indicating that the entire personnel of these 181 mines or plants had been given the Bureau of Mines full course in first aid.

An instance of the coöperation of the safety division with outside agencies is the work done in forwarding the "Sentinels of Safety" competition, a type of safety effort sponsored by an outside organization with most of the actual current work, especially of a statistical nature, devolving upon the Bureau of Mines. The safety division personnel have been able to secure the entrance of a number of mining companies into this competition, and much time, effort, and expense are annually expended by safety division field men in the actual delivering of the awards to the winners of the various trophies, as the winners usually are fairly well distributed through the various parts of the United States.

One of the most notable of the coöperative activities of the safety division during the year was that in which many of its field men throughout the country assisted the Portland Cement Assn. in its no-lost-time accident drive, this assistance being in the form of giving the Bureau's first-aid course to several thousand employees of the cement industry. Also, the Bureau's engineers participated in a considerable number of safety meetings of the Portland Cement Assn. and gave talks and suggestions on safety. The cement industry is making noteworthy strides toward elimination of accidents, having had the best accident frequency rate of 27 of the main industries of the United States in 1929.

One of the most extensive of the coöperative activities of the bureau is that of guiding the Joseph A. Holmes Safety Association and the Holmes Safety Chapters. At the annual meeting of the Joseph A. Holmes Safety Association on March 5, 1930, there were awarded 1 silver medal, 13 bronze medals, and 14 diplomas to persons engaged in mining for heroic services performed. There were also awarded 16 certificates of honor to companies and one to an individual for meritorious safety records; these certificates went to 3 metal mining organizations, 9 coal mining organizations, 2 cement organizations, 1 smelter, 1 organization engaged in both coal and metal mining, and 1 to an individual engaged in metal mining.

(*Continued on Page 42*)

Steam shovel loading a truck on the quarry floor.

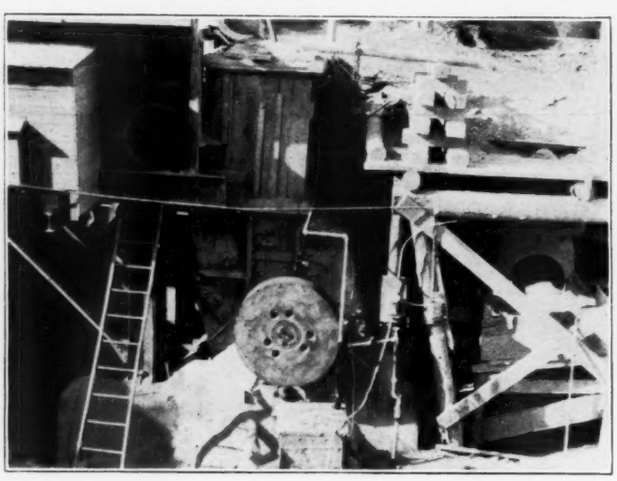
New Crushed-Stone Plant in Ohio Makes Extensive Use of Motor Trucks

Force of Seven Workmen Handles Total Daily Average Production of 500 Tons

TRUCKS are playing an important part in operating a new quarry and crushed-stone plant at Washington Court House, O. In addition to their use in overburden removal, they are used for inter-plant transportation, that is, for handling the blasted rock from the floor of the quarry to the apron feeder of the crushing unit. The success of this method is demonstrated by the fact that all future development of the quarry and the plant in general will be centered on the addition of more trucks and the extension of their roadway.

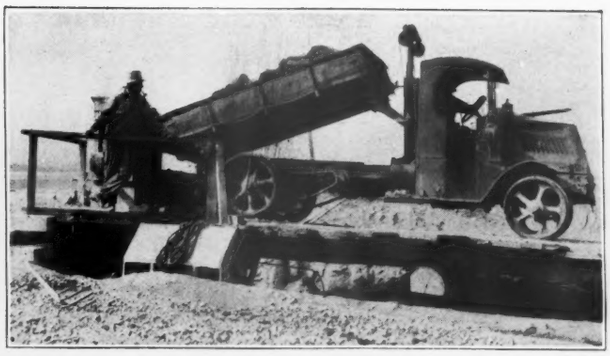
Blue Rock, Inc. is the name of the new company, now completing its first year of operation. The name is taken from the unusually blue color of the limestone found in its quarry. The stone is highly stratified, with a high percentage of breakage upon blasting and avalanching to the quarry floor. The quarry has a light overburden, varying from 8 ft. to practically nil, but averaging about 3 ft. in depth. An extensive amount of stripping was done, prior to the opening of the quarry, by means of an Osgood steam shovel equipped with a ¾-cu. yd. dipper, loading into two Mack 5-ton trucks. This same equipment with the addition of another truck is used for loading and transporting the blasted limestone.

Blast-holes are drilled by a Clipper well-drilling rig, made by the Loomis Machine Co., Tiffin, O. This employs a 4-in. bit. Holes are drilled 32 ft.



Close-up view of the two crushers, conveyor and receiving hopper.

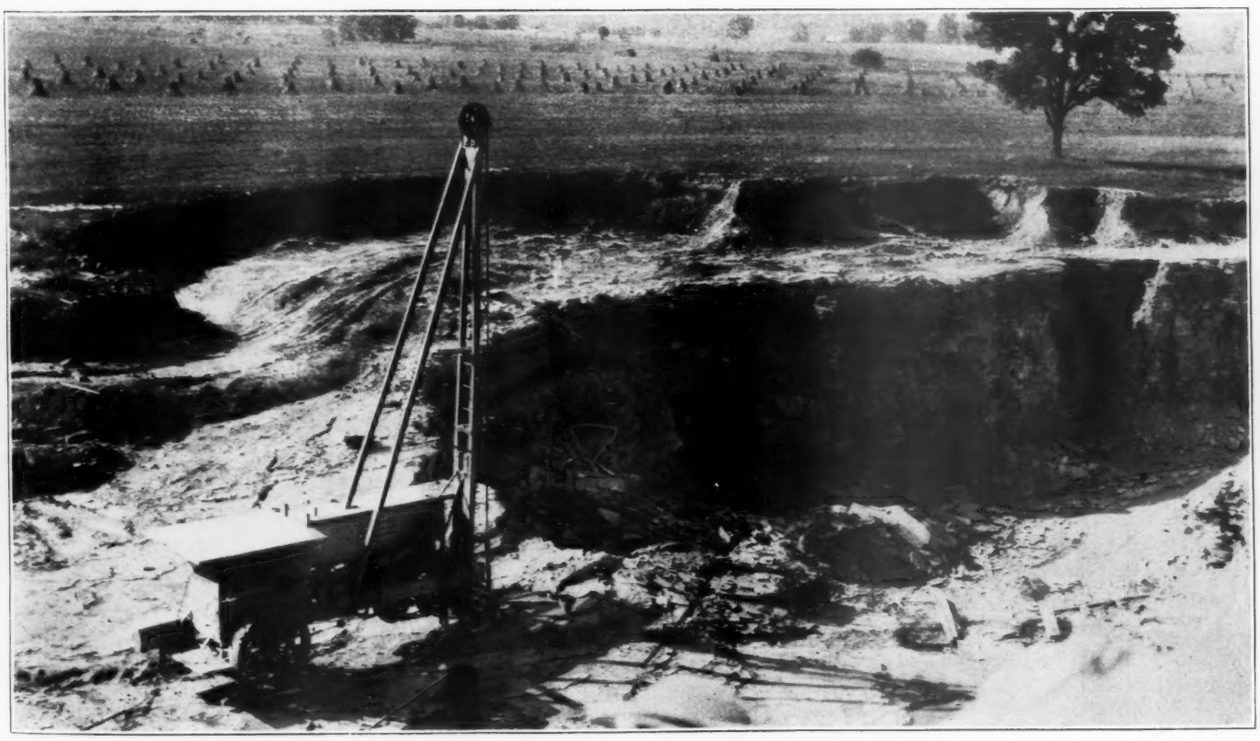
Double unit of vibrating screens viewed from below.



Truck unloading stone to crusher hopper.

deep, as the quarry face is about 30 ft. high. Hercules Gelamite No. 1 powder is loaded into the holes, each hole containing from 90 to 100 lb. of powder. Cordeau-Bickford fuse is used as the detonator, firing from 6 to 12 holes per shot.

Blasting of the quarry was planned to allow an easy incline for the trucks to enter and to leave the quarry floor. This incline consists of a natural rock footing, surfaced with screenings. It is amply wide for two trucks to pass one another and there are no sharp curves. The incline is a gradual curve from the quarry floor to the ground level, and is a complete 180-deg. curve. Space is provided at the floor of the quarry for the trucks to turn around and to back up to receive their loads from the shovel. Thus the trucks drive down the incline instead of backing down as is the case with many construction excavations. Ten minutes' time is required for a truck to be loaded, then driven to the point of dumping at the crusher hopper, and returned for another load. By using three trucks, a steady flow of material is maintained without interrup-



General quarry view with well drill operating on ledge.

General view of the plant showing crushing, handling and storage facilities.

tion. As the length of the drive is increased, more trucks may be necessary. Under the present arrangement, the trucks do not meet on the incline. While one truck is unloading at the hopper, another is being loaded at the shovel, while the third is on its way to the quarry floor. From six to nine tons of rock are carried normally by each of the Mack 5-ton trucks. Excellent economy of operation is reported for their use, with a long life and low maintenance cost.

The crushing plant is located in a pit blasted out of solid rock. This permits the crushers to be fed from hoppers which receive the blasted rock at ground level. A Williams No. 5 Mammoth Junior hammer crusher is the central unit of the crushing plant, and receives all the blasted rock handled by the ¾-cu. yd. dipper of the shovel, crushing it in one operation to the finished size. Practically 90 per cent of the crushed rock will pass a 1½-in. screen. Breakage is done with a minimum of dust. A General Electric 150-hp. motor, direct-connected to the crusher, serves as its drive. The crusher is fed by a Link-Belt 24-in. pan conveyor, 12 ft. on centers, driven by a 7½-hp. motor. A 12-ft. by 8-ft. steel-lined hopper mounted over the pan conveyor receives the blasted rock from the Mack trucks and acts as a surge bin, permitting a steady flow of material to the Williams crusher.

Another crusher, a McCully No. 6, is mounted adjacent to the Williams. This unit is an auxiliary only, and is set to produce No. 34 stone only. It is driven by a 50-hp. motor and is fed from a platform directly over its spider.

Crushed stone from the two crushers is elevated to the classifying screens by a 205-ft. belt conveyor consisting of a 24-in. Goodyear rubber belt traveling on Columbus Conveyor Co. pulleys and idlers. A 20-hp. motor serves as its drive. From the conveyor head-pulley, the crushed material is chuted to the top deck of the first vibrating screen. Two Niagara screens are employed, each having three decks. At present, the top screen is equipped with a 2-in.-mesh upper deck, a 1½-in.-mesh middle deck, and a 1-in.-mesh lower deck. All 1½-in. and 2-in. stone with the oversize is chuted to the first storage bin, the 1-in. stone to another bin, and the throughs are directed to the top deck of the second screen. This second unit has a ¾-in.-mesh top deck, a ⅜-in.-mesh middle deck and a 1⅛-in.-mesh lower deck. The respective sizes of stone and screenings are chuted to bins beneath. Each vibrating screen unit is driven by a 5-hp. motor. The present bin structure is temporary: it will be replaced, in the

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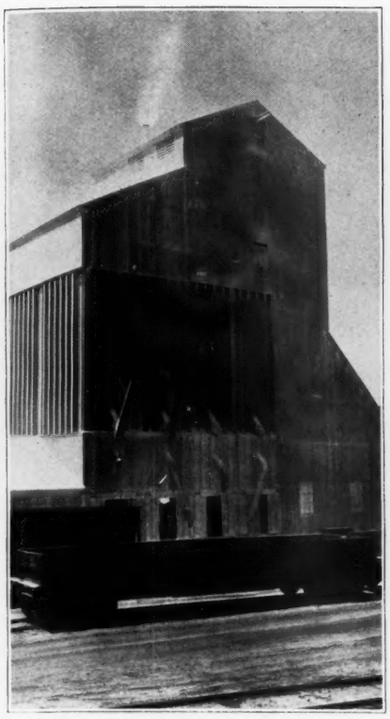
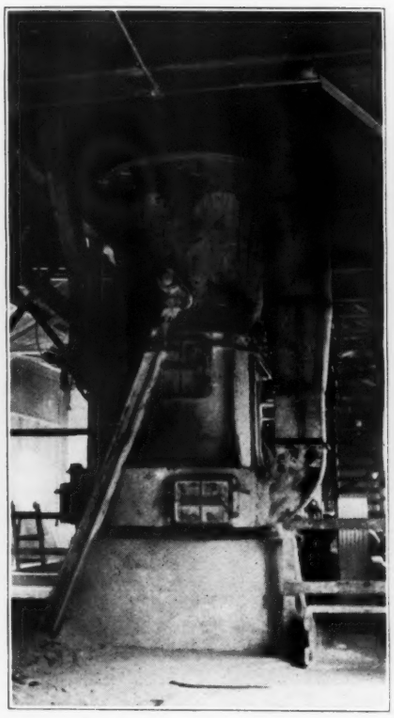
Scale for weighing out trucks. Gasoline pump is conveniently placed for supplying the trucks.



A view of the new drying building from the loading side.



Roll-mill for producing fines and the air separator.

Screening house above bins. Conveyor to storage building in foreground.

Flexibility of Operation in Lime Plant Aided by New Drying System

Particular Care Taken in Quarry to Insure Cleanliness of Raw Materials

By FRANK E. COOMBS

THE stone-drying plant of the Ohio Hydrate & Supply Co. is not only thoroughly modern but it turns out a product that has gained popularity for certain uses on account of its extreme dryness and fineness. The finest product will pass a 300-mesh screen and contains less than 0.03 per cent free moisture.

The story of Ohio Hydrate is a romance of business success founded on careful management through the use of modern methods and the finest equipment. While this article is primarily a description of the new drying plant, a brief outline of the flow of the material from quarry face to drier will be of interest.

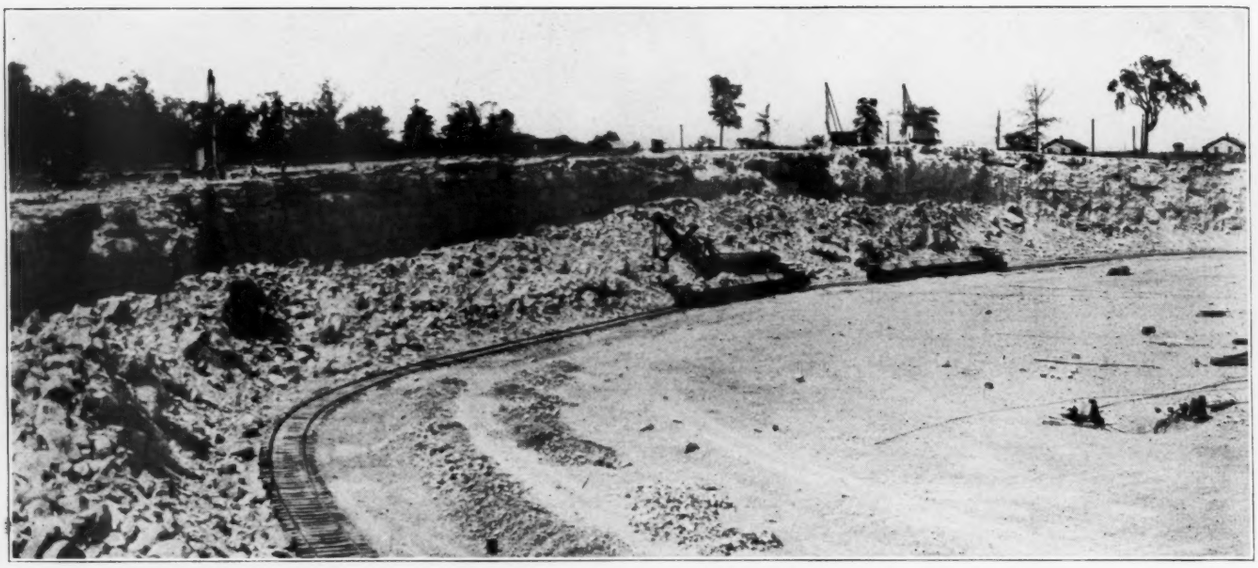
The plants of this company are located in Woodville, O., the center of the northwestern Ohio finishing-lime district and frequently termed "the lime center of the world." The state of Ohio produces more than half the hydrated lime manufactured in the United States.

About 40 of the 336 acres of limestone land owned by the company are covered by the plants and quarry. The stone is a high-grade dolomite containing a very small percentage of impurities. The deposit runs into the hundreds of feet in depth and is covered by an overburden of varying thickness but not excessive. This overburden is removed with a Marion Model 21, 7/8-cu. yd. crawler-mounted steam shovel to a considerable distance from the face to prevent any foreign material becoming mixed with the rock in the quarry as cleanliness of the stone is of utmost importance. Two Marion electric shovels, a Model 92 and a Model 37 are used to load the stone, and two Plymouth 18-ton gasoline locomotives haul it to the crusher.

Three Clipper drills, manufactured by the Loomis Mfg. Co., drill holes 10 ft. from the face of the quarry and 10 ft. apart. Two rows of holes are loaded with from eight to ten tons of Atlas 40-per cent dynamite and shot at one time. The quarry face is from 45 to 50 ft. high and has few seams or natural partings.

The trains that haul the stone to the crushing plant operate on a standard-gauge track with six Easton 8-cu. yd. all-steel cars in each train.

The crushing plant located in the quarry is a model of efficiency with a Curtis air hoist dumping the cars of stone to a Traylor apron feeder. This feeds the stone to a Traylor 60-in. by 84-in. primary jaw crusher that has a capacity of 5,000 tons each 10-hr. day. The crushed stone is taken by a Link-Belt pan conveyor and discharged on a Robins roll



The quarry, with stripping, drilling and loading operations in progress.

grizzly, the larger size—5-in. to 8 in.—going into a storage bin from which it is withdrawn into Atlas 2½-cu. yd gable-bottom dump cars, pulled by an electric hoist up an incline, and dumped into the kilns.

There are three batteries of twelve large kilns each, with a combined capacity of 600 tons of lime daily.

The stone which passes through the grizzly—that is, stone smaller than 5 in.—is fed to a Robins 30-in. belt conveyor, 371 ft. long, and carried to the top of the screening house on the ground level. A Goodrich Rubber Co. belt is used on this conveyor. This conveyor, as well as the other conveyors, is enclosed by a structure of steel and corrugated, galvanized iron. At the top of the screening house the material falls from the belt conveyor to a Robins grizzly with 8-in. rolls and, from this, to a Robins Bronc shaking screen. Then follow four Hum-mer vibrating screens, one of them a two-deck machine which makes three products.

In the screening house are ten bins, each with a capacity of three carloads, so arranged that both open-top cars and trucks can be loaded simultaneously. Ten sizes of commercial stone are produced and sold for various purposes, including the chemical trade, general concrete work, highway, steel, fluxing, and agricultural meal.

The stone-drying plant is built entirely of steel, concrete and corrugated-galvanized iron and is designed to give flexibility of sizes and of handling the finished products. The building was designed by the officials of the company and the structural steel used in its construction was furnished by the Bellefonte Bridges & Steel Co., Bellefonte, O. It is located near the screening house and is connected with that structure by a steel and corrugated-iron gallery which houses a Webster Mfg. Co. 24-in. belt conveyor. This conveyor carries material, ⅜-in. to dust, to the storage bin above the drier.

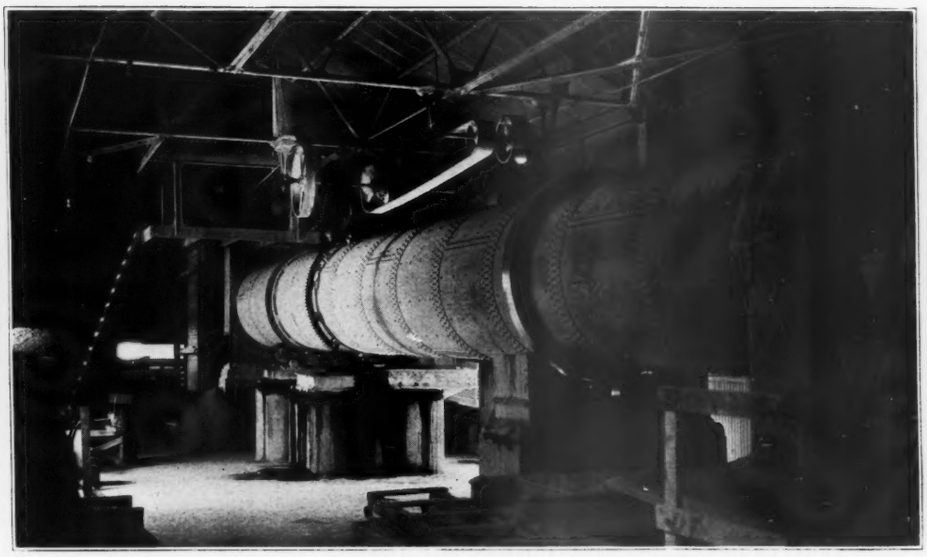
The drying plant is not entirely dependent on the screening plant for material as an elevator, installed between the two buildings, allows trucks to dump screenings, taken from a stock-pile, to an elevator which delivers them to the belt conveyor that connects the two buildings. This is one example of the flexibility of operation that is apparent throughout the plants of this company.

The storage tank for undried stone is directly over the drier, the amount of material delivered to the drier being regulated by a Poidemeter, the percentage of moisture controlling the feed.

Locomotive and cars at the central crushing building.

Automatic packing machines filling the bags.

Drier-to-classifier elevator.



The 60-ft. returnable drier which permits maximum use of heat.

The Louisville return-current drier, built by the Louisville Drying Machinery Co., Inc., of Louisville, Ky., is 60 ft. long. Hot gases from the furnace pass through an inner flue transmitting a great portion of their heat directly to the stone. The gases then return in the space between the shell and the tube, counter-current to the travel of the stone. In this way, the maximum use of the heat is accomplished, lost radiation is reduced to a minimum, and burning or scorching are eliminated. The furnace of the drier is fired with Ohio slack coal by a Detroit stoker feed.

After passing through the drier, the stone drops into a bin from which it is handled by a Fairfield Engineering Co. elevator to a Raymond classifier where all dust is separated from the granular material. The dust is elevated directly to bins from which it is shipped in bulk or is packed in valve-bags and sold for agricultural purposes.

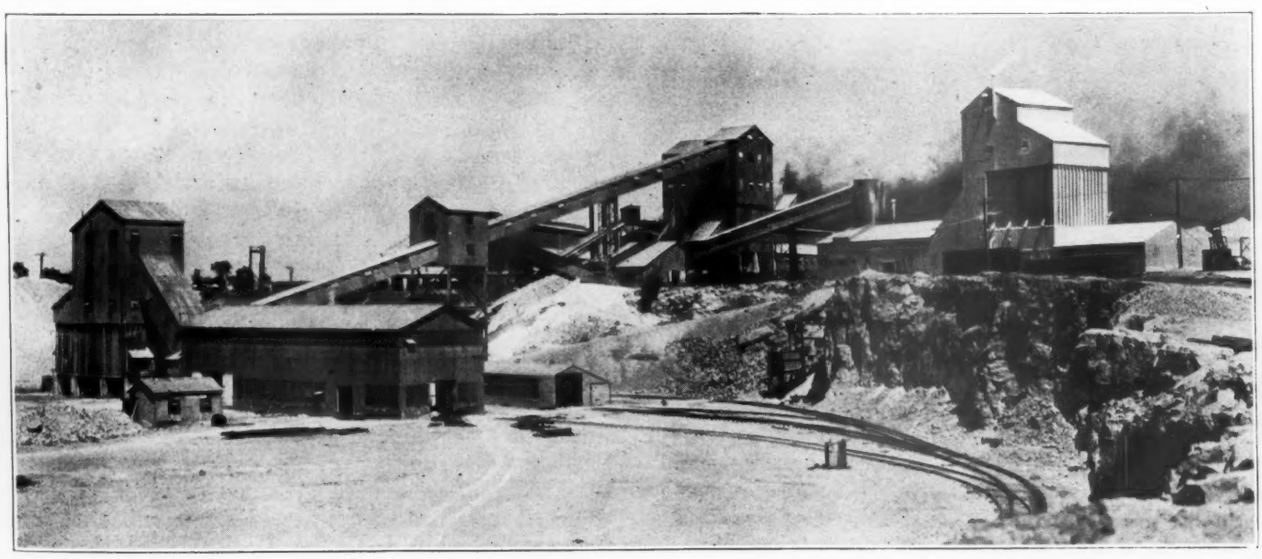
The granular dust-free stone is elevated to Tyler Hum-mer screens where it is graded into four sizes.

As this material is sold principally to glass producers, it must be free from iron. Removal of all free iron is accomplished by a magnetic pulley in the conveying system between the separator and the screens.

For making asphalt filler or rock-dust for coai mines, part of the granular material is diverted to a Raymond roll mill. The product of this mill is sold also to feed and milling companies, their customers recognizing the value of this mineral in stock and poultry feeds.

Sidetracks, served by the Pennsylvania Railroad, are located on both sides of the drying plant, and the bins and loading doors are so arranged that either bulk or bagged material may be loaded from either side or from both sides at the same time. All material sold in sacks is packed in valve-bags by two Bates baggers.

Power for all plants is furnished by electric motors. Ideal Electric and General Electric motors were chosen for driving the machinery in the new



General view of the Ohio Hydrate & Supply Co. plant.

Classifier which separates dust from granular material.

drying plant. The general office of the company is at Woodville in a modern office building owned by the company. Officers actively engaged in sales or production are Fred Witmer, president; Otis E. Bittinger, general manager and purchasing agent; and J. R. Reaver, plant superintendent.

New Crushed-Stone Plant in Ohio

(*Continued from Page 38*)

future, by a steel structure with a greater storage capacity. Six bins are provided by the timber structure, at present, with a capacity of 100 tons each.

One of the remarkable features of this plant is the fact that seven men produce the entire output which averages 500 tons of finished product per day. Three men handle the trucks, one man operates the shovel, another the drill rig, the sixth man is stationed at the crusher hopper, and the seventh man is at the bins.

Blue Rock, Inc. has for its officers Joseph W. Barker, president; James E. Barker, vice-president; C. T. Uible, secretary-treasurer; and H. B. Biehm, general manager. Beginning in a small way these men have succeeded in establishing a growing business, with an output rivaling larger plants with many times the amount of equipment and number of men. Future plans include the installation of a primary breaker in the quarry below the floor and the removal of the present Williams hammer crusher to the quarry to serve as a secondary crusher. Crushed materials will be conveyed from the quarry to the screening plant by means of a belt conveyor. The method of intra-plant transportation employing trucks will be continued but the trucks will operate only on the quarry floor from the shovel to the primary breaker hopper.

Shipping facilities include a 1,500-ft. side-track on the Detroit, Toledo & Ironton Railroad, with B. & O. Railroad connections. A considerable amount of the output is shipped by truck to nearby road-construction jobs and, for this reason, a Fairbanks 36,000-lb. scale has been installed to check truck weights and their loads.

Bureau of Mines Report for Year

(*Continued from Page 35*)

The safety division made arrangements for the presentation of these certificates and medals, in most cases, at public gatherings. It is estimated that the full time and effort of at least three persons are expended yearly in sending representatives to make these presentations, in furnishing speakers at the chapter meetings, and other miscellaneous activities connected with this work.

The U. S. Bureau of Mines has been able to give notable assistance to American industries in devising improved methods of mining and treating various non-metallic minerals, and in perfecting methods by which non-metallics of low grade could be so beneficiated as to render them available for the comfort and welfare of mankind. The Bureau's activities along these non-metallic mineral lines are centered at its experiment station at New Brunswick, N. J., although notable work on non-metallics has been performed at other of the Bureau's experiment stations. It would be impossible to enumerate all of the investigative work on non-metallic minerals performed by the Bureau.

The Bureau of Mines, in Coöperation with the U. S. Geological Survey, has been charged with the task of finding commercial potash deposits in Texas and New Mexico. To date 17 wells have been drilled in this exploration program. While the particular potash salts that have for so long been imported from France and Germany have not been found in commercial quantities, extensive deposits of polyhalite have been located. Studies now under way give promise that these polyhalites can be so treated as to render them available to the American farmer at favorable prices, thus helping to relieve our farming industry from foreign domination of the fertilizer market.

Through its experimental work with the kaolins of Georgia, Washington and other states, the Bureau has demonstrated that American kaolins can be used largely to replace those imported from England and other foreign countries, thus aiding the American manufacturer of chinaware.

The Bureau has demonstrated that many of the domestic ochers and siennas in the Pacific Northwest and other regions can be used to replace minerals imported from Turkey and other countries. It has pointed out ways for the conservation of large tonnages of phosphate rock heretofore wasted in the Florida phosphate mining region.

The fluorspar operators of Illinois and Kentucky have been shown how, by the application of new methods, greatly increased recoveries can be made.

In the field of stone quarrying the Bureau has been able to reduce wastes and to show how large quantities of waste material can be utilized.

The Bureau is conducting a series of studies of mining methods and production costs at representative non-metallic operations, which should be of the most practical benefit to the operators.

The Bureau has compiled a large number of information circulars dealing with the technology and economics of important non-metallic minerals.

A Study of Crawler Tractors as Applied to the Pit and Quarry Industry

By M. F. BEISBER

PART THREE

HOIST attachments have come into wide use in recent years. For erecting equipment or heavy machinery, a hoist-equipped tractor proves invaluable. Considerable use has been made of hoist-and-winch-equipped tractors in the oil fields. In fact, a complete line of this equipment has been intended especially for oil-field requirements. Many sand-and-gravel plants employ hoist-equipped tractors to manipulate power drag scrapers.

The Highway Trailer Co. of Edgerton, Wis., has developed several sizes of winches adaptable to standard crawler tractors. They are equipped with Brown-Lipe, four-speed-forward, one-speed-reverse transmissions which give them a wide operating range. An external brake, with 120 sq. in. of effective brake area, insures positive control at all times. Operating levers are located to the right of the tractor controls for convenient finger-tip control. One model designed for a 30-hp. tractor, produces a 64,000-lb. pull in first speed on an 8-in. drum. In fourth speed, a 12,600-lb. pull is produced on the same-size drum. Another model designed for a 60-hp. tractor produces a 206,000-lb. pull on an 8-in. drum in first speed and a 40,500-lb. pull in fourth speed with the same-size drum.

Hysters are made by the Willamette-Ersted Co., of Portland, Ore., and Peoria, Ill. They are made in various sizes for the leading makes of tractors, each being designed in accordance with the power available from the tractor upon which it will be installed. Hysters are usually mounted on the rear of the tractor, receiving power from the power-take-off. The operator has a jack-seat facing the rear where the control levers are grouped. Standard models provide two speeds forward. Several models have one forward with one reverse speed. Regular drawbar work is not interfered with.

Miami winches are of the one-lever type control, and are usually installed on the rear power take-off of standard tractors without interference with the tractor drawbar. The one-lever control is made through an adjustable disk clutch and a brake. This lever is normally held in a forward position by a coil spring and, in this position, the brake is firmly engaged with the drum to hold the load. When the lever is in neutral position, the drum is released, permitting reversal under load. In the farthest position toward the operator, the lever engages the clutch. Timken and New Departure bearings are used in this hoist. Miami winches are made by the Miami Trailer-Scraper Co., Troy, O.

The Seminole hoist is built for wheel-type tractors equipped with Trackson Crawlers. This hoist is mounted so that all stress is applied to the track frames. Power for the hoist is obtained from a White 2-speed power take-off. A reverse drive on the countershaft gives the machine two speeds in reverse. Double automotive-type brakes, lined with woven asbestos, are furnished. Alemite-Zerk lubrication is standard equipment. The cable drum is 8⅝-in. in diam. and has a capacity of 4,000 ft. of ⅜-in. cable. Seminole hoists are made by the Resistor Engineering Co., Muskogee, Okla.

Two models of hoists built by the Trackson Co. of Milwaukee, Wis., are designed for use on either crawler or wheel-type tractors. The Model HC is a two-drum unit. Both the 8-in. and the 9-in. drums are driven through friction-cone clutches. Power is taken from the motor at the power-take-off by means of a roller-chain-and-sprocket drive. The Model HM also is a two-drum machine, and has similar specifications. One feature of the HM model is its patented level wind. This mechanism winds the cable evenly, layer on layer, regardless of the size cable used. Working with it is an anti-backlash which keeps a proper tension on the cable when it becomes slack.

Loaders

An attachment which should find considerable use in the pit and quarry industries is the loader. A loader-equipped tractor provides a handy means of light excavation, stripping, and loading from stock-piles.

Miami loader which replaced 9 men in clay pit.

The Master loader has a planetary power unit attached to the rear of the tractor which raises the load to the desired height. An automatic brake mechanism retains the load in this position until a forward movement on the control lever releases it. One model is designed for a Caterpillar Thirty having a ⅝-cu. yd. bucket. It has a lifting height of

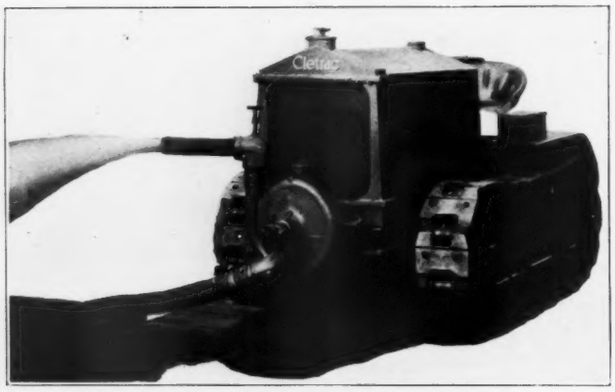
Trackson high-lift shovel dumping into Iron Mule.

9 ft. Another model designed for the Caterpillar Sixty has a lifting height of 13 ft., using a 1½-cu. yd. bucket. They are made by the Master Equipment Co., Los Angeles, Cal.

Two types of loaders are made by the Trackson Co. of Milwaukee, Wis., for the Model 20 McCormick-Deering tractor or for the Allis-Chalmers Model U industrial tractor. One type, called the low-lift shovel, has a lifting height of 40 in. This model is for digging, spreading and carrying crushed rock and other bulk materials. The high-lift shovel has a dumping clearance of 7 ft. and is used for digging materials and loading them into trucks. Both types of shovels are equipped with ½-cu. yd.-capacity (water-level) buckets. The low-lift unit employs a roller-chain drive from the side power take-off. A multiple dry-disk clutch and a self-locking brake are standard in the hoisting assembly. The high-lift unit employs a front-end drive independent of the tractor clutch or transmission. The hoisting assembly is anchored to the front and rear axles to relieve the frame of undue strains. The hoisting drums are driven through a worm-gear drive and a twin-disk clutch.

Portable Pumps

Another attachment of great utility is the portable pump. These units are readily attached to the standard makes of tractors and are extensively used for emergency water supply, quarry water removal, fire protection and the like.



Barton pump driven from front power-take-off.

Both low- and high-pressure pumps are made by the American Steam Pump Co. of Battle Creek, Mich., and sold under the name of the Barton Portable pumps. For low pressures the B1-A is built in 2½-in., 3-in., and 4-in. sizes. The 4-in. pump will deliver 600 gal. per min. at a head of 20 ft. Model B2-A is made in five sizes from 1¼-in. to 4-in. These sizes have larger capacities than the B1-A. Among the high-pressure pumps, the C-1 will deliver 375 gal. per min. at 120-lb. pressure; the C-3, 300 gal. per min. at 120-lb. pressure; and the FB-2, 275 gal. per min. at 75-lb. pressure. Each model is equipped with an automatic primer which removes all air from the suction line. A clutch is provided to engage the pump as required. When the pump is not in use the drive shaft is kept in place by a coil spring to prevent rattling. Each model has a special power take-off, designed for the front of the engine.

Scrapers and Dirt Movers

Scrapers and dirt-movers are classified into two types—the rotary and the wheel type. The rotary scraper is a combination scraper and bucket, having a cylindrical shape. Operated as a trailer, the tractor tows the scraper over the site of dirt removal. After filling, it is towed to the point of dumping,

Allis-Chalmers tractor drawing rotary scraper.

where the operator pulls a trip-rope which releases the bowl, causing it to turn over and to spread the material. The wheel-type machine is generally built in larger sizes with capacities ranging from 2 cu. yd. to 5 cu. yd. or more, while the rotary scraper is generally built in ⅓-cu. yd. to 2-cu. yd. capacities. As indicated by their name, scrapers, or dirtmovers as they are sometimes called, are primarily dirt-handling machines. Their use in pit and quarry industries will center about the removal of overburden, the scraping and building of plant roads, and the spreading of stocked materials.

Rotary Scrapers

A rotary scraper, made by the Baker Mfg. Co., Springfield, Ill., has automatic draft control, that is, the cutting edge is automatically forced up when the pan is loaded or when the tractor exerts a certain drawbar pull, thus permitting the scraper to slide along with the bowl tilted. It has one-man operation with three latch-stops for the loading, spreading and dumping positions respectively. Four

models are built with rated capacities of 13 cu. ft. to 40 cu. ft.

Euclid rotary scrapers, made by the Euclid Crane & Hoist Co., Euclid, O., are rated according to the length of the bowl; the 4-ft. bowl has a capacity of ½ cu. yd.; the 5-ft. bowl, ¾ cu. yd.; the 6-ft. bowl, 1 cu. yd.; and the 7-ft. bowl, 2 cu. yd. They are automatic in operation.

Killefer scrapers, made by the Killefer Manufacturing Corp. of Peoria, Ill., and San Francisco, Cal., also have three positions of operation, controlled by dump ropes. In the loading position the depth of cut can be adjusted by means of a hand crank. Four small sizes are made, from the No. 26 with a capacity of 18 cu. ft. to the No. 29 with a capacity of 31 cu. ft. Three larger sizes, requiring a drawbar pull of 25 hp. to 50 hp., have capacities ranging from 42 cu. ft. to 75 cu. ft.

Perry automatic scrapers, made by the Perry Co., Sidney, O., are also of the one-man type, with control by ropes from the tractor-driver's seat. The No. 4 has a capacity of 13 cu. ft. and the No. 7, 2 cu. yd.

The Western rotary Fresno, one of the products of the Western Wheeled Scraper Co., of Aurora, Ill., is designed to be used with tractors having a drawbar horsepower of 30 or less. The No. 15 has a 5-ft. cutting width with a recommended size of tractor of 10 hp. The No. 15, also with a 5-ft. cutting width, is of a heavier pattern for which a 30-hp. tractor is recommended. For the 6-ft. scraper a 30-hp. tractor is recommended.

Wheel-Type Scrapers

The Ateco Dirtmover has a wheel-assembly pivoted to the back of the scraper bowl. By means of a hydraulic cylinder mounted on the scraper frame, the wheels are raised or lowered, to set the position of the cutting edge. The wheels, when

Ateco wheel-type scraper beginning cut.

forced downward by the hydraulic cylinder, raise the bowl clear of the ground; when drawn upward, off the ground, the wheels add their weight to the bowl. When filled with water, an additional weight of 3,500 lb. permits the loading of harder materials than could be otherwise loaded without scarifying. The hydraulic cylinder receives its power through oil pressure delivered from the tractor power take-off. A single lever operates its clutch and controlling valve, thereby disengaging the gears to reduce wear. A three-way valve permits the use of the Ateco hydraulic bulldozer at the same time. Two sizes are built, the S-8 and the S-10, with capacities of 2 cu. yd. and 4 cu. yd. respectively.

Euclid wheel scrapers have an automatic cut-control, which governs the depth of cut to suit the

Shaw wheel-type scraper in dumping position.

pull of the tractor. Under heavy pulls, the pan-bit tends to rise to the surface of the ground instead of hogging in. The wheels and the drum shaft are equipped with Hyatt roller bearings. Controls are located at the rear of the scraper. One man can handle a train of four or five units at normal tractor speeds. The Euclid wheel scraper, built in 1-cu. yd. and 1½-cu. yd. capacities, is made by the Euclid Crane & Hoist Co., Euclid, O.

The Highway Trailer scraper has a power-take-off transmission mounted on its frame for the purpose of raising and lowering the pan and for driving a chain of rakers which pull back the dirt from the bit. The scraper pan is carried on an axle in a channel-iron frame, supported by two wheels and hooked to the tractor by a drawbar and pin. When the pan is full, it is up-ended, wheeled any desired distance, and dumped through a dumping door. Three sizes are made: a 2-cu. yd. unit for a 20-hp. tractor, a 3½-cu. yd. size for a 30-hp. tractor, and a 3½-cu. yd. size for a 60-hp. tractor. Timken and Hyatt bearings are featured in the wheel and transmission construction. Highway Trailer scrapers are made by the Highway Trailer Co., Edgerton, Wis.

The Miami power-operated scraper employs a winch mounted on the back of the tractor for its power supply. By means of the winch, the pan can be raised when meeting obstructions without backing; it can dump over embankments, into fills, or against a wall; and it can dump whether moving forward or backward or standing stationary. It is built, in ¾-cu. yd. and 1-cu. yd. capacities, by the Miami Trailer-Scraper Co., Troy, O.

Two models of wheeled scoops are made by the W. A. Riddell Co. of Bucyrus, O. The Model A has a 1-cu. yd. capacity and the model T has a 2-cu. yd.

Garst Power-Plow scraper. Note hoist-equipped tractor.

capacity. An automatic end-gate makes transport of loose material, such as sand, possible without spilling. The large wheels are Timken-bearing equipped. Each wheel has an internal expanding clutch enclosed in a dirt-proof housing. They are controlled by a single rope for each scoop in a train.

Shaw True-Cut heavy-duty scrapers are built by the Shaw Excavator and Tools Co., Worthington, O. They are built in 1½-cu. yd. to 4-cu. yd. capacities. Shaw scrapers utilize a winch or optional hydraulic equipment on the tractor power-take-off for the operation of the scraper-pan. Their features offer one-man operation, short turns, rear dump with automatic grader, and availability of the winch. Crawler treads are optional on the larger sizes.

The Western Tumblebug, made by the Western Wheeled Scraper Co., Aurora, Ill., is built as a scraper of 1-cu. yd. capacity. It has an independent adjustable cutting blade which cuts through the ground like a draw-shave, filling the pan. Additional yardage is obtained by operating two or more Tumblebugs in a train. One man can operate the entire train through primary and secondary levers. One Tumblebug can be operated by a 15-hp. tractor, two by a 20-hp. tractor, and three by a 30-hp. tractor.

Power Drag-Scrapers

Power drag-scrapers are used extensively in sand and gravel plants for excavating raw materials from the pit, stripping overburden, storing, and reclaiming materials from stock-piles. Equipped with a double-drum hoist, a tractor can readily serve as the power unit for a scraper. Or, if a stationary hoist is used, belted power from the tractor can be used to drive it. With a double-drum hoist, one drum, operating at a speed of approximately 200 ft. per min., handles the load cable; the other drum, operating at from 400 to 600 ft. per min., handles the other cable, to return the bucket rapidly to the loading position. The range of the operating span is from 100 ft. to 500 ft.

The R. H. Beaumont Co. of 319 Arch St., Philadelphia, Pa., builds a line of cable drag-scrapers in ⅓-cu. yd. to 6-cu. yd. capacities, handling from 150 to 2,000 cu. yd. of material per day. Some of the features of the scraper design include a straight front to prevent snaking, and adjustable front and rear chain-hitch, and double-end digging teeth.

Another drag-scraper, the Plow power scraper, made by the Garst Manufacturing Co., Chicago, Ill., has two front castings shaped like plowshares. The bucket portion of the unit is covered to prevent over-digging. When the scraper is filled, this cover compels it to float. Garst Plow scrapers are made in ½-cu. yd. to ¾-cu. yd. capacities.

Crescent scrapers are made by the Sauerman Bros. Co. Inc. of Chicago, Ill. They are built of curved steel plate with a moldboard action which is claimed to fill the bucket within a few feet of travel. The Sauerman company markets wire rope designed specifically for scraper use. Crescent scrapers are built in ⅓-cu. yd. to 1-cu. yd. capacities.

Crawler-Type Trailers

Three types of crawler wagons, suitable for quarry operations, are made by the Athey Truss Wheel Co., Chicago, Ill., including side-dump quarry trailers, rear-dump trailers and 3-way-dump trailers. All types of equipment are mounted on Athey Truss Wheels, with or without hydraulic hoists.

Athey Truss Wheels are of the rigid-rail type, the rails acting as inclined planes upon which the load is raised gradually over ground obstructions. The track-wheels are mounted on Timken or Hyatt anti-friction bearings. Alemite lubrication is standard on all sizes. Five models are made, with capacities

Sauerman power-drag scraper operated from a hoist-equipped tractor.

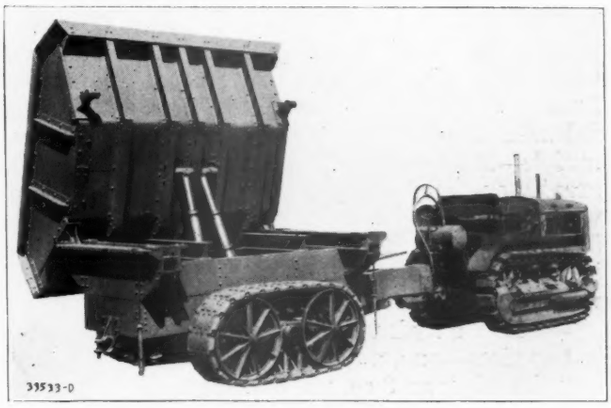
ranging from 3-ton loads to 20-ton loads. The 3-ton size has a ground contact of 5 sq. ft. per pair, and the 20-ton size, 16 sq. ft. per pair.

Athey quarry side-dump trailers are equipped with Easton Phoenix bodies, designed for heavy-duty quarry and contracting work. They are built with wide top openings to speed up the spotting of the shovel dipper. Equipped with Commercial telescoping hydraulic hoists, the bodies can be raised to a dumping angle of 40 deg. Dumping is controlled by the tractor operator, by means of a hydraulic pump mounted on the power take-off of the tractor. All bodies are built with a false bottom consisting of a ½-in. steel plate with a 3-in. hardwood filler bolted to the floor of the body. There are no gates, doors or other complicated mechanisms. The 10-ton size, with a capacity of 5 cu. yd., is recommended for use with a 35-hp. tractor. The 15-ton size, which handles an 8-cu. yd. load, is recommended for use with a 60-hp. tractor.

In the rear-dump trailer field, the Athey company builds four sizes all of which are equipped with Athey Truss Wheels. The smallest size, of 3-ton capacity, employs a gravity-dump body. The latter has a stiff-leg attachment which automatically holds the body in the dumping position until another pull on the control lever breaks the stiff-leg toggle and permits the body to return to the down position. The 6-ton, 10-ton, and 15-ton sizes are equipped with Commercial bodies and Commercial hydraulic hoists which are operated by means of a hydraulic pump mounted on the tractor power take-off. On the 10-ton and 15-ton sizes, the bodies have rear gates which open and close automatically.

Two sizes of 3-way dump trailers are built to serve as all-purpose units—dumping to the right, left, or the rear. A 10-ton size is suitable for use with a 30-hp. tractor, and a 15-ton size with a 60-hp. tractor. The bodies and hoists are Commercial three-way dump, with all gates downfolding and closing automatically. When dumping to the side or the rear with this type of body, it is not necessary to run over the end of the fill, hence the distance of travel per trip is shortened. Dumping positions are controlled from the front of the body by the tractor operator.

The Davenport Locomotive and Mfg. Corp., Davenport, Ia., builds two sizes of crawler wagons, one size having a capacity of 5 cu. yd., the other 7 cu. yd. The smaller wagon is built in the cart type without a front-wheel truck. It has a ship-channel frame with a heavy center tie-rod to prevent bulging. Standard equipment includes a hand-operated dumping and door-lifting mechanism. An air-operated dump mechanism, controlled from the tractor, is available at extra cost. Platform bodies and three-way dump-bodies also are available. The 7-cu. yd. wagon can be furnished with or without a



Athey side-dump wagon with Easton body. Note hydraulic hoist operated from tractor.

wheel type front truck, as desired. Davenport crawlers are of the rigid-rail construction, employing a truss-type track chain. The wheels are mounted in an H-frame for additional ruggedness and protection from twisting strain. All wheels are Timken equipped. Each crawler is designed for a load of 15 tons.

Several interesting features of design are incorporated in the Dreadnaught crawler wagon, a product of the Electric Wheel Co., Quincy, Ill. Dreadnaught crawlers are of the rigid-rail type, self-supporting, with the track composed of shoes and connecting links. The connecting link of each shoe permits an easy inward folding movement over the track wheels. Upon leaving the wheel, the shoes fold outward to form the track in contact with the ground and the slotted link reaches the limit of its travel against the link bolt, resulting in the formation of a rigid and level bridge upon which the track wheels travel. Locked track pins and link-bolts provide a rocking action instead of a revolving motion which is claimed to reduce wear.

The track-wheel assembly is designed for the use of Hyatt roller bearings lubricated by Alemite fittings. Each crawler assembly has a rated capacity of 15 tons.

The Dreadnaught BD 7-8 dump wagon is built with a heavy H-beam drawbar, rigidly attached by steel castings. Its rigidity permits easy backing. The two dumping doors are hung on chain hinges and are equipped with either hand-operated or mechanically-operated wind-ups. An un-

Electric Wheel Co. Dreadnaught crawler wagon.

obstructed clearance of 27½ in., maintained under the center axle, permits free dumping and easy getaway. Grader wagons have a level capacity of 6¼-cu. yd., and a heaped capacity of 7½-cu. yd. The shovel wagon has level and heaped capacities of 7¼-cu. yd. and 8½-cu. yd. respectively. When used loaded, the manufacturer recommends a 60-hp. tractor. Two wagons can be handled under favorable operating conditions, and one under conditions of "bad going."

Three types of crawler wagons are manufactured by the Euclid Crane & Hoist Co., Euclid, O. These employ the Euclid Track Wheels. The latter are units made up of one-piece interlocking shoes which form a rigid track between the wheels.

Euclid Track-Wheel wagons are built in three models—hand-operated, hydraulic-operated, and gravity-operated—with sizes for every type of work. The dump wagons are built in capacities of 5, 5½, 6, 7 and 8 cu. yd. The dumping and winding mechanisms are mounted on the rear of the wagon.

The Euclid hydraulic rear-dump wagons are built in two sizes—one, a 5-cu. yd. unit for a 30-hp. tractor; the other an 8-cu. yd. unit for a 60-hp. tractor. These units are particularly useful in dumping over banks or in making high fills. The tail-gate of the bodies can be hinged either on the top or bottom, or can be removed entirely when handling large rocks. The hydraulic jack on the wagon is controlled by an oil pump installed on the tractor. This same pump unit can be used for either the bottom-dump wagon or the rear-dump wagon.

A 6-cu. yd. gravity-dump wagon has been designed especially for road builders. The body is reinforced to withstand severe usage in hauling rock loads. The manufacturer claims that a 30-hp. tractor has repeatedly handled a wagon of this type, loaded with rock, up 5-per cent grades, in high gear.

The crawler-wagon line of the LaPlant-Choate Manufacturing Co., of Cedar Rapids, Ia., includes both 6-cu. yd. and ⅞-cu. yd. bottom-dump wagons and an 8-cu. yd. three-way-dump wagon. All models employ the Road-Layer tracks which are manufactured by this company under the license of patents belonging to the Caterpillar Tractor Co. The Road-Layer track link is a single casting which forms its own rigid rail for upward pressure, and is designed without trip chains, trusses or other internal-working parts.

The Six Yard wagon is of the bottom-dump type and is equipped with either a hand-operated or a hydraulic door-lifting mechanism. Its body is built entirely of steel, hot riveted and electric-welded throughout, and is mounted on the regular 10-ton size Road-Layer tracks. The tongue is built with a one-piece box section, consisting of welded channel sections and steel plates electrically welded.

Because of a hydraulic-hoist system for operating the door-raising mechanism, one man can be eliminated from the working crew. A small gear-pump, operated from the power take-off on the tractor, provides oil under pressure to a hydraulic-winding mechanism which is mounted on the drawbar of the wagon. The use of the hydraulic door-lift eliminates the danger of having a man climbing on and off moving wagons to raise the doors by hand.

The Model DW-7 wagon is of similar construction to the Six Yard wagon. This model has a heaped capacity of 7½ cu. yd. and has a ground clearance of 24½ in. Standard 15-ton Road-Layers are used. Either hand-operated or hydraulic door-lift mechanisms can be furnished. The Model DW-7 can be equipped also with flare boards for shovel service. These flare boards are readily detachable and, when mounted, add one cu. yd. to the loading capacity.

The three-way-dump wagon is of particular use in construction work, such as the building of dams, roads and the like. It will prove of service in the pit and quarry industries, largely in the transporting of waste material and its subsequent dumping over treacherous places where a bottom-dump car might be difficult to handle. The body of this wagon, built by the Differential Steel Car Co., Findlay, O., features the use of a 2-in. cushion of seasoned wood on the floor. This cushion is placed on top of the lower floor plate and is covered with a renewable ¼-in. plate. Damage to the floor of the car by falling rocks is thereby reduced.

For hoisting, a three-stage, full-telescoping hydraulic jack is used. This jack is mounted on a ball-swivel casting fastened to the trailer frame members. Another ball-and-socket joint is mounted on the top of the hoist with the socket bolted to the body frame. There being no rigid connection between the frame and the body, no undue stress is created when the load is dumped on uneven ground. The hoist is equipped with a relief valve to eliminate breakage in case of over-pressure.

The Three-Way-Dump wagon has a heaped capacity of 8 cu. yd. It has a rear-dumping angle of 50 deg., and a side-dumping angle of 48 deg. Dumping positions are selected by a lever on the front of the body frame, and the actual dumping is controlled by the tractor driver from his seat. A fleet of one or more wagons can be handled by one tractor. A wagon can be turned about in a space of its own length.

Smith Trailers, made by the Smith Trailer Corp., Syracuse, N. Y., are designed to stand up under a

Smith trailer spotted below shovel dipper.

30,000-lb. drawbar pull. All castings in the body are electric steel. The body's design is such that the maximum load weight is directly over the center of the bottom doors, to eliminate the difficulty in dumping materials which have a tendency to arch. The crawlers used are of the five-wheel design, made by the American Manganese Steel Co., of Chicago Heights, Ill. A description of the design and construction of crawler wheels may be found in the crawler-wheel section of this article. The dumping and winding device is located on the rear of the trailer. Four models are made, all using the cart-type construction, the No. 55 having a capacity of 5½ cu. yd.; the No. 65, 6½ cu. yd.; the No. 75, 7½ cu. yd.; and the No. 85, 8½ cu. yd. The first two use the standard 10-ton Amsco track and the latter two, the 15-ton Amsco track.

Several sizes of crawler wagons are made by the A. Streich & Bro. Co., of Oshkosh, Wis. One model, the No. 950, is built in two sizes and is equipped with a 2-hp. gasoline engine which operates the door wind-up mechanism. An automatic throw-out on the clutch disengages the mechanism when the doors are wound up. This wagon is built

Rex-Watson crawler wagon drawn by Allis-Chalmers "75."

in 5-cu. yd. and 7-cu. yd. sizes (water-level measure). Both models are standard with Streich Push-Track crawler wheels. The Streich all-steel trailer No. 1150 has a 20-cu. yd. capacity with a rounded load. This unit has four crawlers, one in each wheel position. Each body has a partition, making two compartments with two sets of dumping doors. The dumping device permits the dumping of either set of doors or both at the same time. Both front crawlers are of the 5-ton size with 10-in. treads, while the rear crawlers are of the 20-ton size with 20-in. treads.

Four sizes of Watson Creeper Wheel semi-trailers are made by the Rex-Watson Corp. of Canastota, N. Y. Two of the models, Nos. 5100 and 7150, have capacities of 5 and 7 cu. yd. of material respectively. With side sections, the No. 6100 has a 6-cu. yd. capacity, and the No. 8150 has an 8-cu. yd. capacity. The chassis of all four models are balanced on Watson Creeper wheels and are equipped with goose-neck-type drawbars to permit the tractors to undercut for short turns. The dumping and wind-up mechanism is mounted on the rear. A special-design winding mechanism, equipped with roller bearings and special worm wheels, has a positive locking arrangement.

Western crawler dump-wagon. Note front-wheel truck.

Two types of crawler wagons in three sizes are made by the Western Wheeled Scraper Co., Aurora, Ill. The cart type, without front wheels, is made in 5-cu. yd. and 7-cu. yd. capacities. The load is carried on Athey Truss Wheels of either 10-ton or 15-ton capacity. The door-winding mechanism on this model is mounted on the rear. A rear drawbar, which is standard on all models, is so designed that all stress is taken by the side frame members instead of the rear cross-bar. A 7-cu. yd. wagon is also built, with 15-ton Athey Truss Wheels recommended, although 10-ton wheels are furnished if desired.

Crawler dump wagons with front-wheel trucks are the second type made by this company. One size has a capacity of 7 cu. yd. and another 10 cu. yd. Both are equipped with two sets of dumping gates, which can be dumped simultaneously or separately.

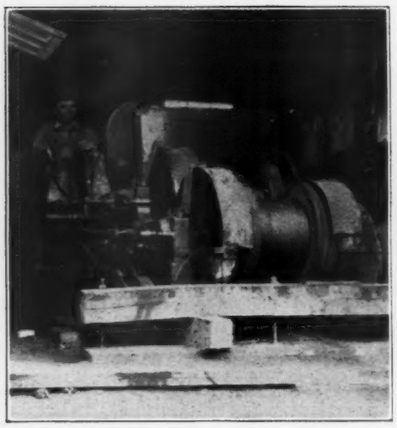
According to the manufacturer, a 60-hp. (at the drawbar) crawler tractor can easily handle two or three 5-cu. yd. cart-type wagons under favorable conditions. A 30-hp. tractor can handle one 5-cu. yd. wagon. A 60-hp. tractor can haul two 7-cu. yd. crawler wagons with front-wheel trucks and can turn the train on a fill 30 ft. wide. Under favorable conditions, a 60-hp. tractor can haul two 10-cu. yd. wagons.

Crawler track units are available for installation on practically all types of wagons and hauling equipment where the usual wheels are employed. Most manufacturers of crawler wagons market these units in several sizes, capable of handling all classes of haulage.

The American Manganese Steel Co., Chicago Heights, Ill., builds the Amsco Track Unit. This crawler has wheels and links of manganese steel. A fifth wheel is employed in the unit to support the track shoes between the front and rear wheels. No truss or bridge links are used in the track. Timken bearings are used in all five wheels.

The crawler track units of the Athey Truss Wheel, Davenport Dreadnaught, Euclid and La-Plant-Choate have been described in the paragraphs devoted to crawler wagons.

The Trackson Co. of Milwaukee, Wis., has recently entered this field with the Trackson Crawlers. The principal features of design are track wheels of large diameter, and track shoes which form a rigid rail between the front and rear wheels by means of special links that are retained in place by U-shaped bolts fastened to each shoe.



Operator at hoist controls.

Counter-weighted loading chute.

Loader operating at stock-pile.

Installs Screen So That Road Officials May Inspect Quality of Gravel

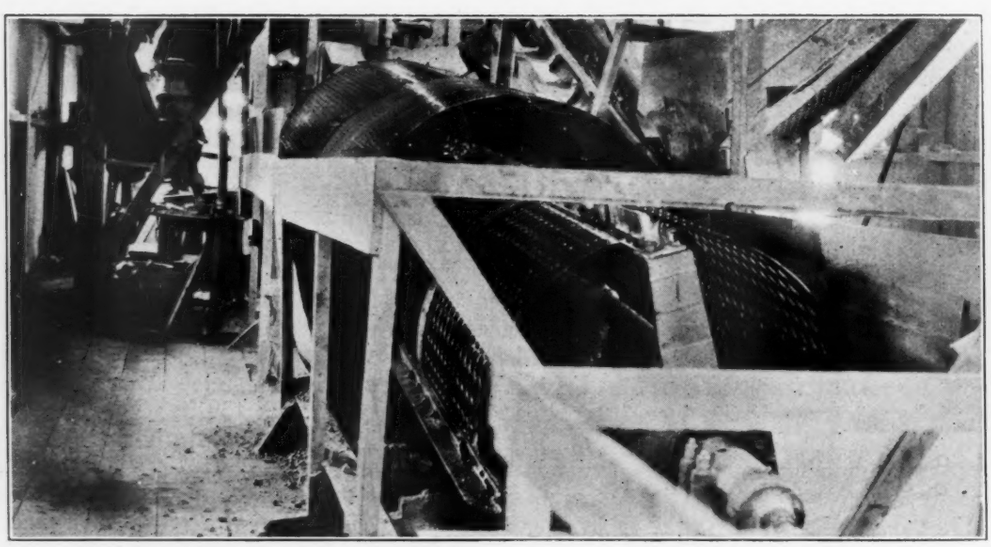
Camden, O., Operator Supplies Aggregates for Road Work and Concrete-Stave Plant

MAXIMUM capacity with a minimum amount of labor was the goal achieved by the White Gravel Co. in the design of its new plant at Camden, O. While not a large plant, it is capable of producing and loading 400 cu. yd. of sand and gravel in a 10-hr. working day, employing but four men. Gregg Bros. & Ulrich, owners of the White company, are owners and operators also of a sand-and-gravel plant at West Alexandria, O., which has been in operation for four years.

For the convenience of state-highway inspectors, the concrete-size gravel is passed over a small home-made vibrating screen placed in an almost horizontal position similar to a picking table. An electric light above illuminates the table, enabling the inspector to view the gravel as it passes on its way to the storage bin.

The White gravel plant is located at the edge of Camden on an 800-ft. by 1,000-ft. area of land having a 60-ft. deposit, estimated at 1,500,000 cu. yd. Shipments are made in the surrounding townships from both plants by trucks, and a considerable quantity of material has been supplied this season for a nearby Indiana road-construction job. One contract, calling for 15,500 cu. yd. of aggregates for a 5.3-mile concrete road from Boston, Ind., to the Ohio state line was being filled at the time this plant was visited.

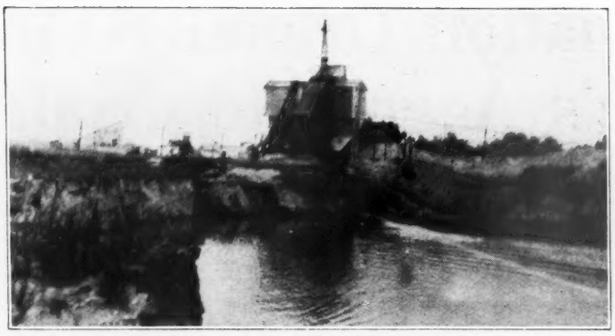
A considerable portion of the company's output is used in the making of the well-known Neff & Fry



Classifying and washing is effected in these jacketed, revolving screens.

Supt. C. E. Gregg.

Super-Concrete staves, which are used by so many plants for silo-type storage bins. The Neff & Fry Co. has its main offices and factory in Camden, not far from the White Gravel Co. plant.



Cable-way over pond. Plant in background.

For reclamation of the sand and gravel, a Sauerman cableway equipped with a ¾-cu. yd. bucket and a 90-ft. steel mast delivers the material directly to a 12-ft. by 15-ft. grizzly hopper located on the roof of the screening plant. A Sauerman two-speed, double-drum hoist is capable of handling the bucket at a speed of 300 ft. per min. or at 700 ft. per min. It is driven by a 60-hp. General Electric motor.

The screening-and-washing plant is located above the four Neff & Fry concrete-stave loading bins, housed in a substantial frame structure. As stated, the grizzly hopper receives the material from its roof location, allowing the material below 4-in. to pass to the scrubber. A second hopper located below the last 4 ft. of the grizzly screen allows 4-in. to 9-in. gravel and niggerheads to be chuted to a Universal crusher. Boulders over 9-in. drop to a waste-pile.

A Universal 8-in. by 36-in. jaw crusher, driven by an Imperial 40-hp. motor, receives all oversize material from the classifying screen, as well as the 4-in. to 9-in. material from the grizzly screen. Crushed material is returned to the screen by means of a 50-ft. bucket elevator equipped with 10-in. cast-iron buckets.

The screening - and - washing process takes place in a Morrow Mfg. Co. (Wellston, O.) 5-ft. diameter unit equipped with a 5-ft. scrubber. Material is fed to it by means of a Morrow cradle-type feeder pivoted on the mouth of the grizzly hopper. The reciprocating motion of the feeder is produced by an eccentric on the jack-shaft of the washer drive. Scrubbing action takes place in the first section of the screen where the material comes into contact with jets of water, after which it passes to five sizes of screen—½-in., ¾-in., ⅝-in., 1½-in., and 2½-in.—each section being 4 ft. in length. A sand jacket, 7 ft. of 3/16-in.-mesh screen, covers the first sections of the unit, screening out the sand for the settling tank. Power for the rotary-screen unit is furnished by an Imperial 15-hp. motor through an Allis-Chalmers Tex-rope drive.

Another Morrow unit completes the processing of the material. Sand from the jacket of the rotary screen is flumed to the Morrow No. 60 settling tank which is equipped with drag paddles for dewatering. The drag-chain receives its power from the jack-shaft of the washing screen.

Difficulty was experienced this last summer in obtaining sufficient fresh water from the shallow

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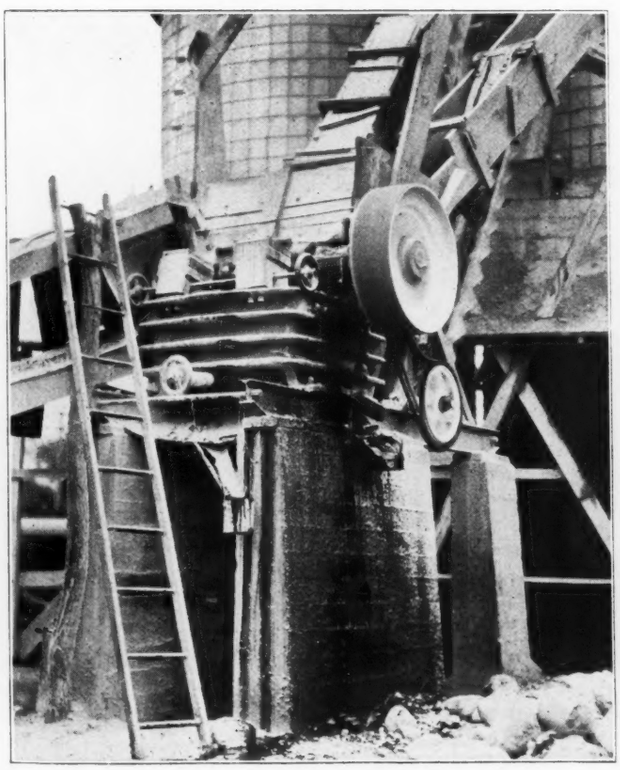


Jaw crusher handling oversize gravel rejected at grizzly.

Delivery trucks being loaded at the bins.

New Association Organized in Texas by State's Aggregate Producers

Crushed-Stone and Sand-and-Gravel Men Abandon Former Separate Organizations

TO promote and extend the use of the products of the industry; to provide an organization for the coöperation of its members and the coördination of their efforts in all matters pertaining to the industry; to establish and maintain business practices of the highest standard.

With the foregoing quotation from its constitution as a declaration of purposes, the Texas Crushed Stone, Sand and Gravel Assn. was formally launched at a final organization meeting held in Austin, Tex., recently.

Officers of the new association are as follows:

President—W. E. Sampson, Texas Construction Materials Co., Houston (formerly president, Texas Sand and Gravel Producers Assn.).

Vice-President—E. Eikel, Dittlinger Lime Co., New Braunfels (formerly president, Southwest Division of the National Crushed Stone Assn.).

Secretary-Treasurer—W. A. Wansley, W. D. Haden Co., Houston and Galveston (formerly secretary-treasurer, Texas Sand and Gravel Producers Assn.).

The above named officers, together with the members listed below form the Board of Directors:

Max Altgelt, New Braunfels Limestone Co., New Braunfels, Tex.

R. J. Hill, Gifford-Hill & Co., Dallas, Tex.

J. P. Lively, Jacksboro Stone Products Co., Jacksboro, Tex.

T. E. Popplewell, Ft. Worth Sand & Gravel Co., Ft. Worth, Tex.

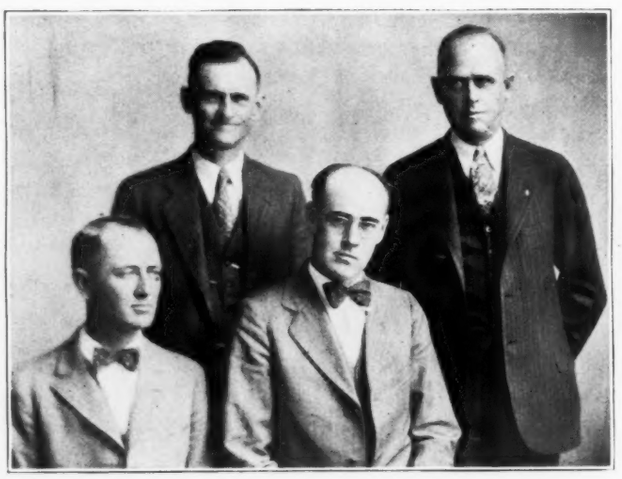
W. W. Carson, Jr., of Austin, was elected executive-engineer by the board of directors.

The newly-perfected organization marks the consummation of plans under consideration for several months for consolidating the Southwest Crushed Stone Assn. and the Texas Sand and Gravel Producers' Assn. The entire membership of the two existing associations, so far as canvassed, went into the new organization, and all the assets, records and data of the two associations were turned over to the new board of directors. Necessary incorporation was had by a properly revised charter filed with the secretary of state of Texas.

The Southwest Division of the National Crushed Stone Association was organized in April, 1926. R. J. Hank, formerly state highway engineer of Texas, acted as executive-secretary for several years, resigning several months ago to again accept a position with that department. The association was well officered and successfully carried on such activities as properly belonged to it.

The Texas Sand & Gravel Producers' Assn. was organized August 1, 1927, duly incorporated under the laws of the state of Texas. In addition to the routine work incident to such an association, it has successfully established a credit bureau and a uniform sales-contract and discount policy.

At several times in the past, the two associations have found it necessary to create joint committees for handling important problems common to the entire industry. A notable example was the southwest freight-rate case under the so-called Hoke-Smith resolution of Congress. Another was the proposed taxation of natural resources and finally, during the past year, the complete revision of aggregate specifications by the state highway department of Texas. It gradually became quite obvious to the membership of each association that their problems are nearly all common to both industries—in fact, that there is really only one industry instead of two.



Left to right—W. W. Carson, Jr., E. Eikel, W. E. Sampson, W. A. Wansley.

Furthermore, some companies are producing both materials. They saw that the troubles of the stone man differed little from the troubles of the gravel man—no more than the troubles at two gravel plants, or two stone plants, may differ from each other. They also recognized that many questions can be handled only by united action. Having reached these conclusions, considerations of efficiency and economy plainly dictated the consolidation, and it was perfected with entire harmony throughout the whole group.

The Texas Crushed Stone, Sand and Gravel Assn. maintains permanent headquarters at 601-603 Littlefield Bldg., Austin, Tex. There are a few producers eligible for membership not represented at the organization meeting who will no doubt come in. When the canvass is completed it is believed that all producers of any considerable size will become ac-

(*Continued on Page 60*)

Loading rock at the quarry with a 5-cu. yd. shovel. At right, one of the locomotives with its load.

Inland's Huge New Crushed-Stone Plant Now on Full-Production Basis

Operation at Head of Lake Michigan Can Turn Out 750 Tons of Material per Hour

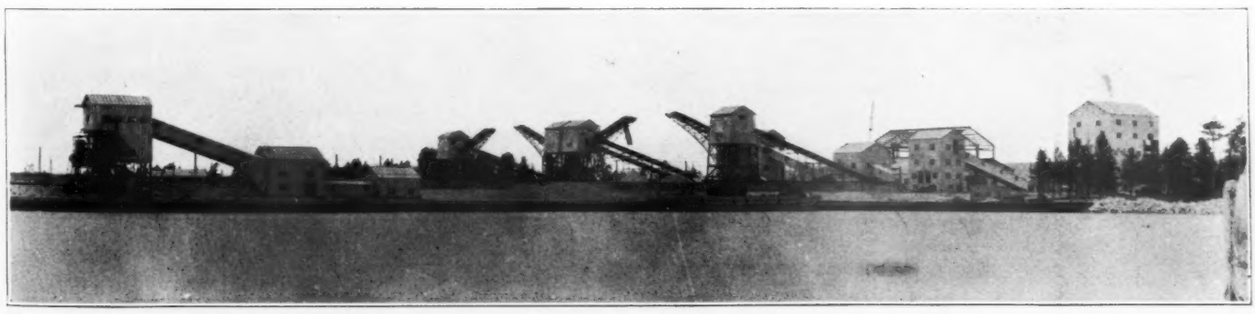
SINCE it is one of the largest plants in the country, the mere scale on which operations are conducted by the Inland Lime and Stone Co. at Port Inland, Mich., should be enough to make it interesting. There are, however, a number of other features that are equally remarkable as examples of how modern crushed-stone-plant practice can be adapted to bulk production.

The speed with which the plant was erected is in itself something of a record, considering its size, and its location. In November, 1929, it was in the project stage as far as equipment was concerned; in November, 1930, it was on a full production basis. In the intervening time, not only did much of the equipment have to be designed from the ground up, built and erected, but a seven-mile railroad and a harbor had to be completed, this part of the program having been commenced in the spring of 1929. To date six cargoes of stone have been shipped from this magnificent new plant. The first cargo was taken by the steamer *Joseph Block*, owned by the company, to the huge works of the Inland Steel Co. at Indiana Harbor, the voyage measuring Lake Michigan at its greatest dimension. The entire project is intended primarily to provide the steel company with fluxing stone.

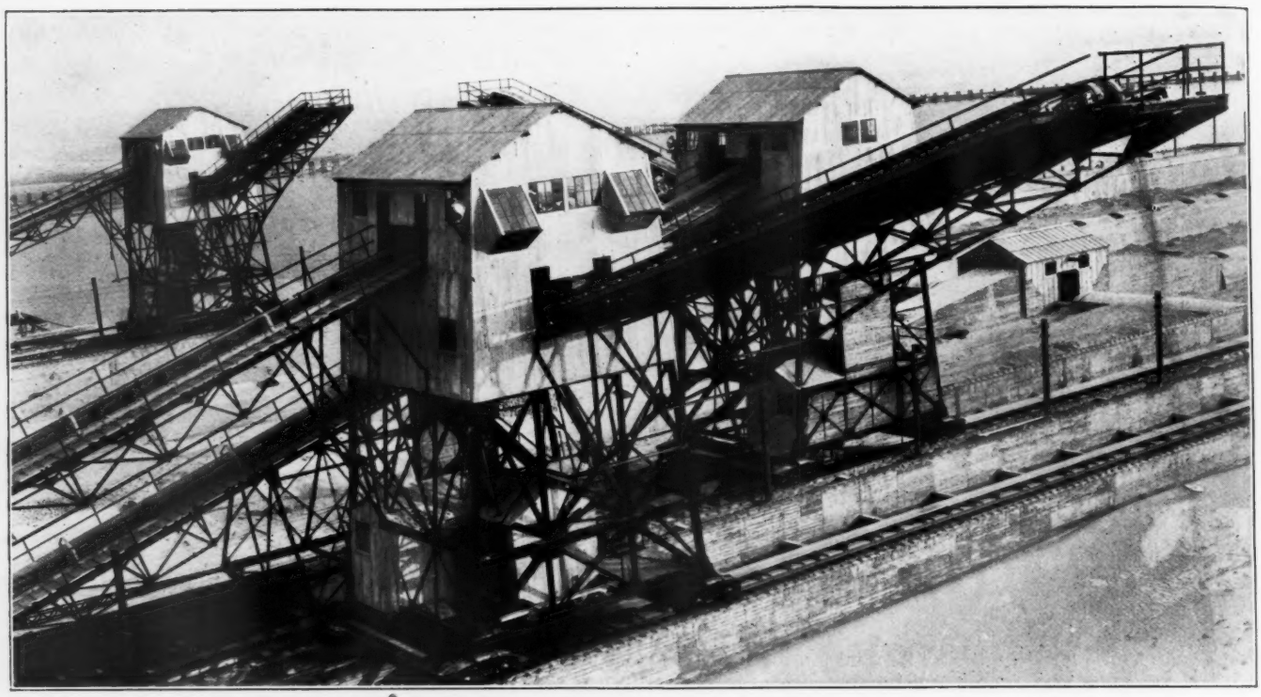
The officers of the stone company are Clarence B. Randall, president; Wilfred Sykes, assistant to the president; George J. Nicholson, vice-president; Gordon W. Hughes, assistant to the vice-president; W. D. Truesdale, secretary-treasurer; J. H. Morris, assistant secretary; and W. Moon, assistant treasurer. A. J. Cayia is superintendent and A. W. Heitman is his assistant. The main offices of the company are in the First National Bank Bldg., Chicago, Ill., while a branch office is maintained at Manistique, Mich.

Since a major part of the production will be shipped by boat during the season of navigation on Lake Michigan, the plant has been designed to produce and to stock sufficient material throughout the year to furnish adequate shipments during the open season for maintaining year-round requirements at the steel works.

The plant will operate this season probably until the middle of January, and hope is entertained for



General view of the Inland plant. The primary crusher-house is at the extreme right, and the loading tower at the extreme left.

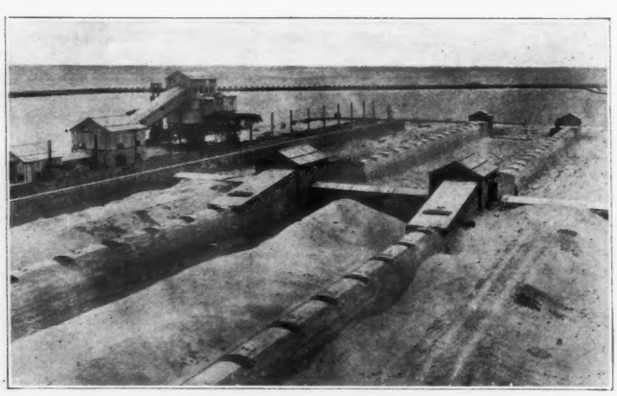


Three of the stackers as viewed from the wing of another stacker which handles the fourth and fifth sizes of crushed stone.

an unusually early resumption of navigation in the spring. Drilling operations will be continued throughout the winter.

Port Inland is located on the shore of Lake Michigan, about 20 miles east of Manistique, Mich., and was built to exploit a large deposit of high-calcium limestone located seven miles inland and north of this point. This deposit lies practically flat, is about 60 ft. in depth or thickness, and has an overburden ranging from 2 ft. to outcrop. It is called Blaney stone and the beds are probably in the Lockport formation of the lower Silurian or Niagara series. It is a gray to buff, highly-crystalline limestone and weighs 168 lb. per cu. ft. in place. The stone is particularly well suited for metallurgical purposes, as flux for open-hearth or blast furnaces, but much of it will be sold for road stone, and the other uses for which limestone is suitable.

The plant was originally intended to handle four sizes of stone, namely: open-hearth stone, 6 to 14 in.; blast furnace stone, 6 to 2½ in.; and commercial stone generally, in sizes of 2½ in. to 1½ in., and 1½ in. to ⅝ in. and under. Recently it was decided to add equipment to handle a fifth size, ⅝ in. to ⅛ in.



Two of the reclaiming tunnels, the main gathering tunnel, and the transfer stations.

The entire plant was designed and built by the Stephens Adamson Co. of Aurora, Ill. It is built for a total storing capacity of 750 tons an hour, and a loading capacity of 3,000 tons an hour, either to lake freighters or railroad cars. Large storage capacity has been provided. As said, the plan is to stock the piles during the season when the lakes are closed, so that there will be an adequate supply throughout the open season. The loading dock is so arranged that boats can be spotted for loading, and cleared when loaded, with a minimum of lost motion and time.

As far as the plant itself is concerned, the methods developed for the crushing, distribution, storage, and general handling of such large quantities of stone at a high rate of speed and without lost motion are decidedly interesting. The best idea of what has been accomplished can, however, be obtained from a more or less detailed description of the plant and its operating procedure. For the purposes of such description, operations can be divided into three classes: those at the quarry, those involved in preparation and delivery to storage, and those under reclaiming and loading.

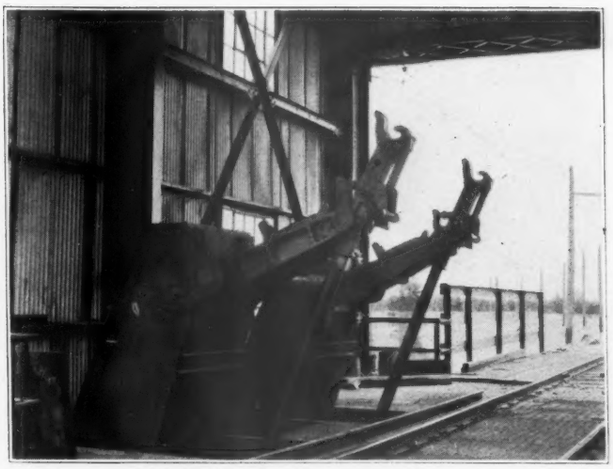
As has already been said, the deposit lies under a light overburden, which greatly simplifies quarrying. In practice, after the overburden has been stripped, six-inch holes are drilled in the rock by Armstrong portable electric drilling rigs. The rigs are mounted on trucks provided with crawler treads, so that they have no trouble in getting over the roughest sort of ground. A quarry face about one mile long is being worked, the entire 60-ft. deposit being quarried as a single bench.

After the rock is shot, it is loaded into cars by two Bucyrus-Erie model 170-B, 5-cu. yd. electric shovels.

Transportation from the quarry to the plant is over a seven-mile, electrified standard-gauge railroad built by the company. The track is built of 90-lb. rails, laid on oak ties. It has one tangent that is 5 miles long. The maximum grade against loads (southbound) is 1 per cent, the maximum grade against empties is 2 per cent. This road has served to bring in much of the plant equipment, and can be used to ship stone by railroad, since there is a spur connecting it to the main line of the Minneapolis, St. Paul and Sault Ste. Marie R. R. (the Soo Line), about two miles from the present quarry operations. One feature of the electrical construction of the railroad is somewhat novel. Setting poles for the trolley wires in the quarry would be somewhat difficult, not to say expensive, by ordinary methods. So the expedient has been adopted of setting each pole in a 2-ft. block of concrete which forms a base sufficiently heavy to hold it upright under almost any conditions. Once placed, it is only necessary to bank sand or loose rock around the block to make the setting practically permanent. When the track is moved it is a simple matter to pick the poles up bodily and set them in their new positions.

Direct-current power to operate the haulage locomotives is supplied by two convertor substations, one located at the quarry, and the other at the plant. The substation equipment in each consists of two 1,000-kw. General Electric motor-generator sets, those at the quarry being arranged for remote-control starting and stopping from the one at the plant. The two electric locomotives were furnished by the Differential Steel Car Co. and are overpowered self-propelled trolley cars. On a loaded trip from the quarry, a locomotive carries 55 tons of stone: on the return trip it travels light. Each locomotive has four 260-hp., 600-volt, d. c. motors.

At present the rolling stock used in transportation from the quarry to the plant consists of a fleet of fourteen 30-cu. yd. Koppel side-dump cars. A like number will be added in 1931. The cars are of the standard side-door dumping variety, with the exception that they are not self-dumping. They are dumped by a specially designed dumping apparatus located at the crusher house. The locomotives themselves are equipped with 30-cu. yd. bodies and are self-dumping by means of a pneumatic cylinder located under each body. The fact that they can be loaded gives them a double rating. Coming in light they are rated at 50 tons. Thus they have plenty of capacity to start and handle a loaded train and they save power with an empty trip, the demand being reduced by the reduction in locomotive weight. The average trip consists of seven cars and the locomotive, or a total of 400 tons per load.



Car unloader in primary-crusher house.

On arrival at the primary crusher house at the plant, the locomotive and cars are dumped directly into the hopper of a 60-in. McCully gyratory crusher, driven by a 250-hp., 600-r.p.m. motor through a Texrope drive, the entire installation having been built by the Allis-Chalmers Co. The dumping track is at an elevation of 27 ft. above

The loading tower on the dock, showing method of lowering and moving the shuttle conveyor.

Interior of a reclaiming tunnel, showing the conveyor and loading gates.

ground level. In dumping, the locomotive is run past the hopper, and the car behind it dumped first. The next car is then dumped and so on, until the trip is empty. Then the train is backed up until the locomotive is in position, when it also is dumped. By adopting this sequence in dumping, the locomotive retains its 100-ton rating as long as there are any loaded cars to be stopped or started.

As said, the cars are emptied by a special dumper. This consists of two pneumatic cylinders, located near the track opposite the hopper. The pistons actuate a series of cranks which raise arms having sockets on the end that engage special cast-iron pads under the car body. When not operating, the whole mechanism is folded back well clear of the track. The control for the dumper is located on a gallery above the track, so that the operator has a clear view of conditions in the crusher hopper. Using this arrangement it is possible to dump a whole train at the rate of a car every 2 minutes, or about 1,500 tons an hour. After being dumped, the stone passes over a grizzly consisting of 14 bars of structural steel, with wearing caps of manganese steel, set 10 in. apart and at an angle of about 38 deg. Stone 10 in. and under goes through the grizzly and is passed directly to the main plate feeder. The oversize goes through the crusher, and then to the feeder. In addition to the hopper just described there is another 11-ft. 8-in. by 11-ft. hopper directly under the track. This hopper has a grizzly with 4-in. by ½-in. bars with 10-in. openings, and discharges to the feeder underneath the crusher.

The feeder itself is rather novel. It is 48 in. wide by 14 ft. long, and consists of a series of manganese-steel pans about 4 ft. long, running on an arrangement that resembles nothing so much as the crawler mechanism of a tractor. The pans are of special construction, being built of manganese steel by the American Manganese Steel Company. The feeder is driven by a 10-hp. motor, at 40 ft. per min., through a Falk gear reduction unit. It discharges directly to a belt conveyor, 4 ft. wide and 209 ft. long that transports the material to the grizzly house.

Grizzly house (left), secondary-crusher house and screen-house, with primary-crusher house in distance.

The conveyor is driven at 450 ft. per min. by a 75-hp. motor and a gear-reduction unit. The control for all equipment drive is centralized and provides an automatic starting sequence. The belt conveyor to the grizzly starts first, then the feeder and then the crusher.

There is one feature characterizing the equipment that makes up the storage and reclaiming facilities that is probably worth mentioning. It is completely anti-frictionized. All of the Stephens-Adamson belt conveyors, most of the Allis-Chalmers motors, which incidentally are used throughout the plant, and the Falk reduction gears, are Timken-equipped. All told there is an approximate total of 20,000 Timken bearings in the installation. The Stephens-Adamson screens are equipped with SKF bearings.

This matter of anti-frictionization is emphasized at this point because it shows how firmly such bearings have become established as an integral factor in modern practice. They will undoubtedly have considerable influence on both the practical and economic phases of plant operation. As to the latter, the savings in lubricant and the labor necessary to attend to lubrication should, in itself, be enough to justify their use. In addition, there are the reduction in maintenance costs, and the increased assurance of continuous service from the equipment to be taken into account.

The second, or storage section of the plant may

be considered as beginning at the grizzly house. At present, the material from the primary-crusher house is delivered to a hopper from which two chutes deliver it to the two live-roll grizzlies for scalping. The chute, like all the others in the plant, is built with a stone box at the turn, so that the stone can collect and form a cushion that will protect the back wall and bottom of the angle from the direct impact of the descending material. Like the other chutes (or for that matter, all surfaces subjected to the sliding action of the stone) it is provided with wear plates of manganese steel. The two grizzlies are of the live-roll variety, one having spiral and the other straight grooves and both having 6-in. openings. They are driven by 20-hp. motors through gear-reduction units and Texrope drives, the motors being located on the stage immediately above.

At present, everything over 6 in. goes to a common chute from the two grizzlies to a conveyor that carries it to a stacker for storage. It can, however, be diverted to another belt conveyor 42 in. wide and 77 ft. long, with capacity of 300 tons per hour, and delivered to a 20-in. secondary crusher for further reduction. The fines go through the grizzlies to a 74-ft. conveyor that carries them to the secondary crusher house. This conveyor also has a capacity of 300 tons per hour. The grizzly house thus forms the first distributing point in routing the material to the storage piles.

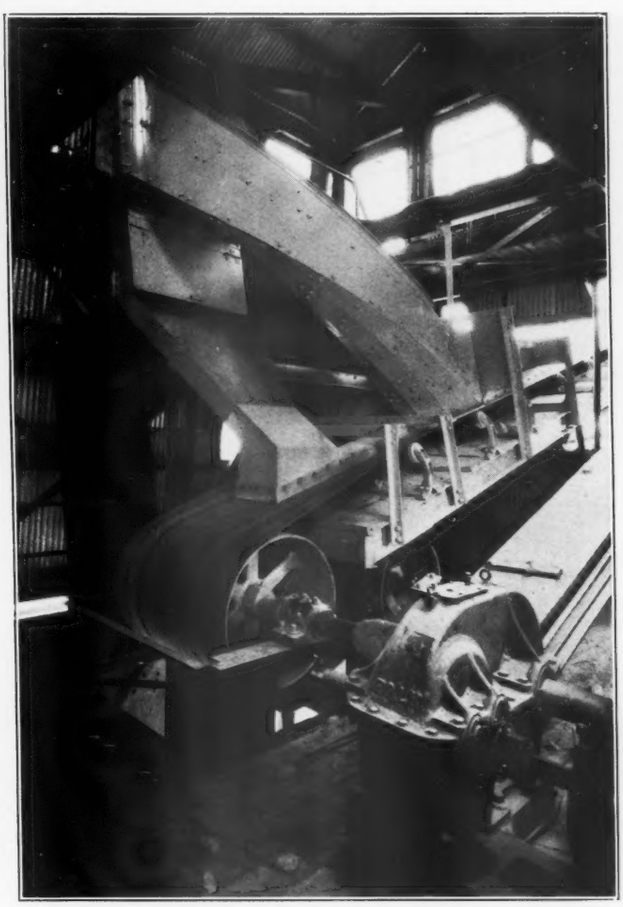
A 6-in. live-roll grizzly, the first distributing point for the stone.

The equipment in the secondary-crusher house consists of one 20-in. Allis-Chalmers McCully crusher, driven through a Texrope drive by a 125-hp. motor, and one Symons cone crusher also driven by a 125-hp. motor and Texrope drive. The general arrangement and routing of material in this house is substantially as follows:

The McCully crusher is used principally to reduce 6-in. material coming from the grizzly house. When crushed, this material is delivered to a 177-ft. conveyor, driven at 850 ft. per min., and having a capacity of 850 tons per hr., which carries it to the screen house. The fines under 6 in. are also delivered to this conveyor by the 74-ft. conveyor from the grizzly house.

The Symons crusher is used to reduce 2½-in. and over, which is brought back from the screen house, in case there is an increased need for smaller stone for storage. When reduced, it is delivered to the same belt that carries material from the McCully crusher, and from the grizzly house, so that the whole mass enters the screen house for sorting on one conveyor. Thus material from three separate sources can be combined in one flow channel for delivery to the sorting process, an arrangement that eliminates a great deal of rehandling, and assures a steady flow of material to the screens.

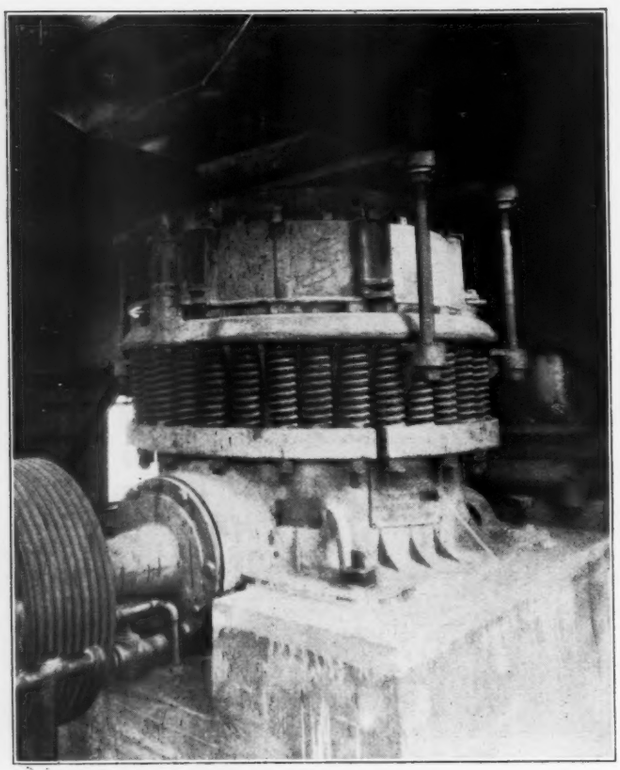
The screening equipment consists of six vibrating screens, four single- and two triple-deck, driven by 7½-hp. motors through Texrope drives. The screens are arranged in banks of two, with the coarser ones above, so that the flow of material between screens is partly by gravity and partly by means of belt conveyors. Considering the rather complicated distribution of the material that must be provided for, the routing is simple. At the upper, or first, bank of screens, material over 2½ in. goes to the bank immediately beneath, and the fines are delivered to tandem belt conveyors 49 ft. long, with a capacity of 225 tons per hr., that deliver them to the bank of triple-deck screens for further sorting. The overs from the screens beneath the first ones—that is 2½ in. and over—may be delivered to a stacker belt for storage or sent back to the Symons crusher for further reduction.



The chutes, in a stacker, that transfer stone from the main conveyor to the wing conveyor, and the drive for the latter.

Two stackers, as viewed from the screen-house. Note the tunnels and houses in the reclaiming system.

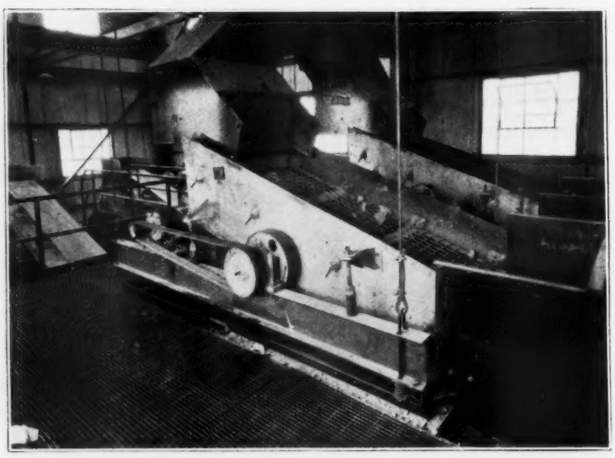
The routing is controlled by means of gates in a double chute. The fines from this bank are delivered to the same belt conveyor that receives the fines from the upper bank, for delivery to the triple-deck screens. These screens have 1¼-in., ⅝-in. and ⅛-in. perforations, so that three sortings can be made simultaneously. The large size, 1¼-in. or over, can be routed to the stacker for storage, or sent back to the Symons crusher. The ⅝-in. material goes to the stacker for storage, and the ⅛-in. material to a belt conveyor for transfer to storage bins whence, ultimately, it will be sent to the last stacker for storage. This last screen operates under water spray, the sludge and water being flumed to the lake. All the material destined for recrushing is gathered on one belt which is 300 ft. long with a capacity of 200 tons per hr.



The cone crusher in the secondary-crusher house.

For various reasons, the routings of the different classes of material from the screen house to storage differ somewhat. The four larger sizes go directly to the stacker, while the present fifth and future sixth sizes go to storage first, as will be explained later. The storage space comprises an area about 500 ft. by 1,200 ft. extending at right angles to the line of material flow from the grizzlies to the screen house, and parallel to the loading dock. This area is divided into two sections by the tracks on which the stackers run, each area between stackers accommodating two piles of different sizes that are parallel to each other.

The stackers themselves are rather unusual in several respects. They are movable towers about 60 ft. high, running on tracks supported on heavy concrete foundations. On the side towards the



Two of the vibrating screens in the screen-house, with shuttle conveyors in the rear.

receiving end each is equipped with an extension about fifty feet long that supports the framework on which its conveyors are carried. Movement along the track is provided by a 40-hp. motor driving one axle through a 21.3-to-1 reduction gear which gives a stacker movement of 50 ft. per min. A 40-hp. solenoid brake on the motor holds the stacker against movement. However, on account of the heavy wind pressures sometimes encountered, there is a supplementary means of braking. This consists of heavy dogs on each truck, which engage slots in each wheel truck.

On the side toward the storage pile, each stacker is equipped with a loading wing, or boom, about 60 ft. long, that extends to about the middle point of its particular storage area. The weight of the wing, which carries a belt conveyor for unloading the material, is balanced by a heavy concrete weight hung on the other side of the stacker. In reality, the stackers are nothing more or less than gigantic belt trippers, the conveyors from the grizzlies or screen house, as the case may be, going up the incline into a house on top of the stacker, and thence down along the track again. Arriving in a stacker, the material is delivered to a curved chute which, in turn, delivers it to the wing conveyor.

Two of the main belts are run between 856-ft. horizontal centers, the actual lengths of the belts

being about 700 ft. These are the belts that handle the two largest sizes of stone. The other two run between 495-ft. and 484-ft. centers respectively. The wing conveyors are all 79 ft. long. The main belt capacity varies with the size of the material, that for the two largest being 640 tons per hr. and for the smaller 280 and 240 tons per hr., respectively. The capacity of the wing conveyor is the same as that of the main conveyor for each stacker.

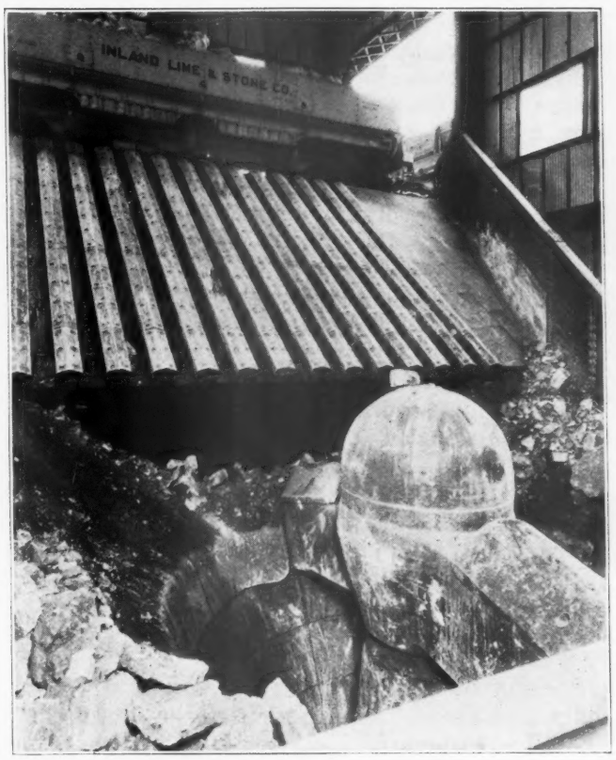
Each of the main belts is equipped with an automatic belt-tension device which, though simple, is effective. The tail pulley is mounted on a small truck, to which is attached a wire rope. The rope runs over a pulley located on top of a small structural steel tower about 20 ft. high, and a cast-iron counterweight is suspended from the other end. This arrangement automatically compensates for any difference in belt tension arising from fluctuating loads or other causes.

The routing of the fourth and fifth sizes is as follows: From the screen, the fourth size is delivered to a conveyor that carries it to a storage bin, whence a second conveyor carries it to the point where it is delivered to the stacker conveyor. The equipment for handling the fifth size consists of a belt conveyor running to a surge bin, designed to hold about one day's run. From the surge bin

The plate feeder from the bar grizzly and crusher to the scalping grizzlies in the primary-crusher house.

another conveyor will carry it to the stacker. The plan is to store the fourth size during the day, holding the fifth in the surge bin. Between shifts, the fifth size will be moved from the bin to the storage pile by the fourth stacker.

It may be of interest to note that the controls for all motors, from the grizzly house to the last stacker are centralized at one point. The control provides an automatic starting sequence whereby the belt conveyors on the last stacker start first, then the belt conveyor from the storage or surge bin to the stacker, and so on down to the grizzlies themselves. Each motor starts at intervals of 30 seconds, which gives all apparatus time to clear itself before the next one starts. Still, there is practically no delay in starting, the whole sequence taking only 5 or 6 minutes. In shutting down, the order is reversed. Thus there is no danger of an accumulation of ma-

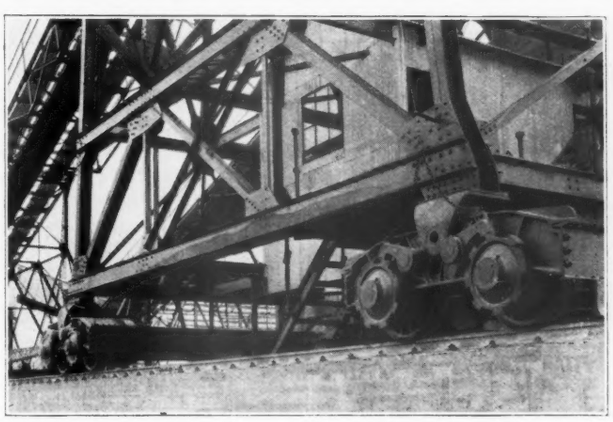


The grizzly and primary crusher. A loaded car from the quarry in position to be unloaded is shown above.

terial sufficient to overload motors, either when starting up the plant or in case of failure at some point along the line.

The layout and operation of the reclaiming and loading equipment is much simpler. Concrete tunnels have been built down the center of each storage area. The tunnels are equipped with loading gates spaced about 20 ft. apart. Located in the tunnels are the reclaiming conveyors each being 370 ft. long with capacities of 1,500 tons per hr. For the two largest sizes of stone in storage, there are two conveyors, back to back, the tunnels being 865 ft. long.

Running at right angles to the reclaiming tunnels is another tunnel, connecting with the loading point. This tunnel houses a 60-in. conveyor which receives material from all the reclaiming conveyors, there being four transfer points. The arrange-



Running gear on a stacker. Note the dog-and-slot arrangement to prevent drifting.

ments at all four are practically uniform, each reclaiming conveyor discharging into a hopper which delivers the material to the transfer conveyor by means of a chute. The transfer conveyor is 487 ft. long, and is driven at 500 ft. per min. by a 125-hp. motor. It has a capacity of 3,000 tons per hr., or sufficient to handle material from any two reclaiming conveyors working together. The transfer conveyor delivers the stone to an inclined conveyor 160 ft. long which, in turn, delivers it to a shuttle conveyor in the loading house.

The inclined conveyor is provided with a Merrick Weightometer for weighing the stone. There are two conveyors in the loading tower proper, one 32 ft. long, with a capacity of 250 tons per hr., called the dribble conveyor; the other, 105 ft. long, with a capacity of 3,000 tons per hr., known as the shuttle conveyor. The former is ordinarily used to load dust, sand and over fine material that is sorted out of the main stream of stone by the grizzly into railroad cars, for waste disposal. The latter is used for loading either boats or cars, as the case may be. It is driven, at 500 ft. per min., by a 40-hp. motor.

Some of the construction features of the loading equipment are sufficiently novel to be interesting. The frame which carries the shuttle conveyor is mounted on a movable carriage (somewhat similar to that of the stackers) which runs on tracks at right angles to the edge of the dock. The carriage is powered with a 40-hp. motor, so that it can be run in and out to spot the conveyors over either cars or ships, as desired. The frame proper consists of two 46-ft. sections, that on the land side being fixed while that on the water side can be lowered through an angle of 25 deg. into the holds of vessels. The motion is imparted by a 20-hp. motor that drives two cable drums through a De Laval speed reducer that gives a lowering speed of about 70 ft. per min. In case of failure of the motor, an arrangement has been provided for raising or lowering the boom by hand. As a result of this construction, the flexibility of the loading equipment has been brought to a very high point.

Installs Screen for Road Officials

(*Continued from Page 51*)

well near the storage bins. A well driller was employed to sink a 10-in. casing to a depth of 35 ft. and plenty of water has been rendered available. A McGowan 4-in. centrifugal pump, driven by an Imperial 25-hp. motor, delivers 475 gal. per min. at a head of 90 ft.

Four Neff & Fry concrete-stave bins store the material for loading delivery trucks. They are 14 ft. in diameter and are 30 ft. high, each having a capacity of 75 cu. yd. above the bin gates. The latter are of interest because of their convenience to the attendant. When a truck arrives, the loading chute is lowered into position and the bin gate is opened, allowing the material to flow into the truck. The weight of the material flowing over the chute keeps it lowered; as soon as the gate is closed, stopping the flow of material, a counterweight raises the chute out of the way. Bin gates with counterweighted chutes are located at the north and south sides of each bin.

Excess materials are stocked outside of the Neff & Fry bins in large piles. Materials from them are reclaimed by a Specialty Engineering Co. loader which employs a Fordson tractor as its power unit.

Three sizes of washed material are generally produced: pea gravel, concrete sand, and No. 46 gravel. The washing-and-classifying screen is readily adaptable to any required sizes of material.

New Texas Association Formed

(*Continued from Page 52*)

tive members, thus embracing the entire membership of both the old associations.

The present membership, which represents about 97,000 tons daily capacity, is as follows:

Dallas Washed & Screened Gravel Co., Dallas.
Dittlinger Limestone Co., New Braunfels.
East Texas Sand & Gravel Co., Dallas.
Fort Worth Sand & Gravel Co., Fort Worth.
Gifford-Hill & Company, Inc., Dallas.
W. D. Haden Co., Galveston.
Hillsdale Gravel Co., Sweetwater.
Horton & Horton, Houston.
Geo. R. Humlong & Sons, San Angelo.
Jacksboro Stone Products Co., Jacksboro.
Midland Sand & Gravel Co., Terrell.
Moore & Moore Sand & Gravel Co., Chillicothe.
New Braunfels Limestone Co., New Braunfels.
Potts-Moore Gravel Co., Waco.
Saxet Sand & Gravel Co., Houston.
Southwest Stone Co., Dallas.
Texas Construction Material Co., Houston.
Texas Sand & Gravel Co., Waco.
Urbana Sand & Gravel Co., Urbana.
Western Sand & Gravel Co , Amarillo.

Ohio Operator Completes New Plant

(*Continued from Page 34*)

sists of a Morris 6-in. pump driven by a Burke 25-hp. motor and mounted on barrel floats. The intake is controlled by a Sasgen Derrick Co. hand hoist. A Hetherington & Berner trap protects the pump against back pressure when it is shut down. The silt is discharged through a pipe line to another pond at some distance from the plant. Black Bros. Co. hose-clamps are used on this line.

All foundations for the plant are of concrete and all framework and buildings are of timber. Stephens-Adamson conveyor idlers and pulleys are used throughout. Each unit is controlled by Cutler-Hammer push-button switches. Trumbull safety switches and Crouse-Hinds conduit are standard.

Although truck shipments only are made, the plant was designed at an angle and at an elevation which will permit a sidetrack to be laid later into the plant for rail shipments.

C. A. Heyl does also a general contracting and grading business. His brother, H. Heyl, supervises the operation of the plant. In addition to the plant office, another office is maintained at 449 E. Hopocan Ave., Barberton. Sand and gravel are delivered in the company's own fleet of White trucks. These are used on other work during slack seasons. The Stuver Bros. Co. also is in the building-materials business.

Anti-Friction Bearings Insure Operating Economy in Crushing Plants

By A. K. WEST
Engineer, Timken Roller Bearing Co.

THERE are few, if any, industries in which the matter of operating economy is as vitally important as it is in what may be described as the stone industry, or rather, that general industry having to do with the handling of rock and its derivations. Rather than have this particular discussion too inclusive, it will be well to confine it to plants that handle crushed stone, gravel or sand. For one thing, their problems are probably the most acute and, for another, the solutions are perhaps less apparent on the surface.

Anyhow, the situation with regard to such plants is substantially as follows: competition is keen; prices are more or less fixed, relatively speaking; and fixed charges for material and plant investment are pretty much on a level among plants of a comparable size. This leaves operating costs as about the only point of attack for increasing profits or, for that matter, in securing the economic existence of the business. Generally speaking, the management that can shave a few cents here and a few more there from running expenses has the advantage.

An analysis of the operating costs in the average plant of this character would probably show the costs, in the order of their importance, as power, maintenance or upkeep, labor, and incidental. This, of course, applies to the plant itself. The cost of winning the raw material will usually show a different arrangement, such as labor, maintenance, and power. Winning costs, however, are only a comparatively minor item of the overall costs in most cases.

To revert to the plant costs, the order of importance in costs also happens to be the order in which they lend themselves to reduction. To explain, power costs are heaviest because plant processes are, for the most part, pure bulk-material handling, and this sort of thing is a heavy drain on power. The fact that maintenance costs come next also is due to the nature of the equipment used and the conditions under which it works. As to labor, modern methods have reduced it to a minimum. Actually, a large proportion of the labor is usually devoted to maintenance rather than to production.

Therefore, the operator who, by any means at all, can effect reduction in these three items has done much to put his plant on a sound economic basis. As to methods, conditions vary so in different plants that it is impractical to even suggest any general remedy. Sometimes an improved arrangement of equipment and a clever routing of material will do it. Sometimes advantage can be taken of purely local conditions to accomplish the desired result. But, in spite of the previous remark about general remedies or methods, there is one that is common to all cases and whose effect will be the same under all conditions. This is the choice of the bearings with which the plant apparatus is equipped. In fact, the influence of bearings on plant operation and especially on the three major items of expense is so great that the result of a careful selection of bearings is sometimes amazing. This can probably be shown best by a detailed discussion of certain individual types of equipment.

Conveyors

In the average plant, belt conveyors are extensively used as the most convenient method of handling the material. And usually they form by far

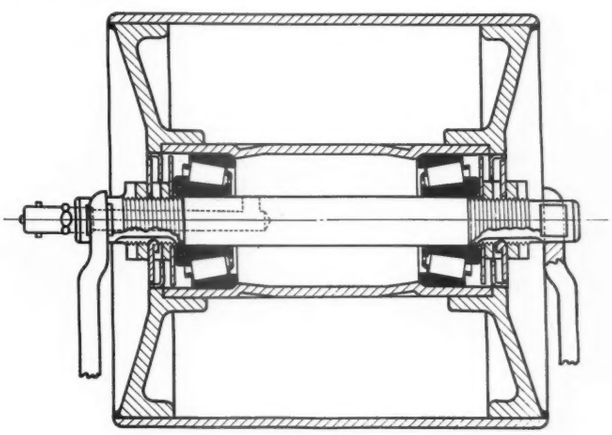


Fig. 1. Typical bearing arrangement for a conveyor roller. A simple but effective mounting.

the largest share of the power load. Convenient and flexible as they are, however, under ordinary circumstances they are notorious wasters of power, and their maintenance expense is correspondingly heavy. This is hardly surprising, considering that even a short conveyor incorporates hundreds if not thousands of bearing surfaces, each one a drag on the motor and a heavy consumer of lubricant, to say nothing of being a potential source of trouble. The obvious remedy and the one that is being more and more generally adopted is to equip the conveyor idlers with anti-friction bearings of types suitable for meeting all of the requirements of the service, and, carrying the matter even further, to similarly equip the head and tail pulleys and all shafts.

The bearing requirements for conveyor-idler rolls can be summed up as: (a) Capacity for carrying sustained loads, both radial and thrust. The latter loads arise from the fact that, in troughing conveyors, some of the idler shafts are set at an angle

to the horizontal. (b) Simplified lubrication, both as to quantity and frequency of renewal. (c) Cheapness of construction, this being important because of the number of bearing surfaces involved. If the mountings could not be made inexpensively, they would be impractical.

A more or less standardized mounting that has been developed to meet these requirements is shown in Fig. 1. The outer bearing races are pressed into a tube which carries the body of the roller, indentations in the tube serving to locate them. The inner races are given a fit on the shaft that is sufficiently loose to permit a certain amount of creepage. The closures, which consist of labyrinth washers, are simple and inexpensive, but they serve to retain

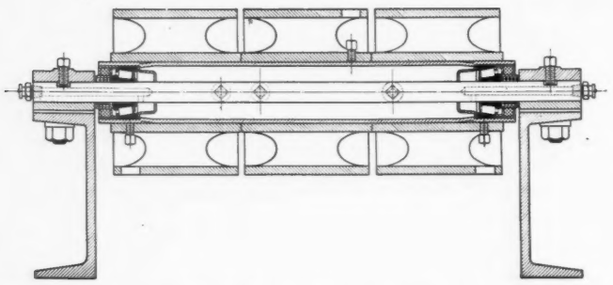


Fig. 2. Bearing mounted for flat return idler on belt conveyor.

the lubricant and to exclude any foreign matter, no matter how fine. And, finally, the whole interior of the supporting tube is available as a storage space for lubricant. Pressure-grease lubrication is used, the grease having access to the interior of the housing through a duct bored in the shaft.

The mounting used for return idlers, while similar in a good many respects, has some differences owing to variation in service requirements and construction. As can be seen from Fig. 2, instead of mounting the bearings in a tube, they are pressed into the idler hub. Instead of using the whole interior of the roller for a lubricant reservoir, a punched-steel stamping is provided with each bearing which fits closely around the shaft and is pressed into the hub ahead of the outer race. This stamping confines the grease to the vicinity of the bearing proper.

Head and tail pulleys are usually mounted in self-aligning pillow blocks, sometimes purchased already assembled from the manufacturer and sometimes specially designed for the case in hand. A good example of the general method of mounting is shown in Fig. 3. The mounting is simple but of sufficient strength to support the loads imposed, even under abnormal conditions.

Simple as these mountings are, their effect on the various operating characteristics of conveyors is anything but simple. Ordinarily one of the main troubles in selecting motor drives for conveyors has been the disproportional starting inertia that characterizes them. The result has been, usually, that they had to be heavily overpowered which, in turn, meant that not only was a great deal of power wasted, but the overall power factor of the plant was poor. With tapered-roller bearings this condition is vastly improved. Not only is starting inertia reduced to a reasonable point, but running demands are lowered anywhere from 20 to 30 per cent. It becomes possible not only to use smaller motors but to select them on a mean-demand basis much more in keeping with electrical efficiency. Thus not only is the initial investment reduced but poor power-factor conditions eliminated, and the cost of power generally quite materially cut.

Much the same applies to maintenance. In the first place, the use of the bearings assures free-rolling idlers, which lengthens the life of the belt and that of the idlers themselves. In the second place, instead of requiring the full time of one or several men for lubrication and general inspection purposes, one man, working part time, can perform all of the necessary work. In fact, it is by no means uncommon for lubrication costs to be reduced as much as 90 per cent.

Last, but by no means least, the bearings give increased assurance of continuous service from the conveyor. These are by no means all of the advantages possible, but they should be enough to indicate what can be accomplished.

Crushers

Crushing equipment of various types offers another fertile field for the beneficial effects of anti-frictionization. Generally speaking, the load char-

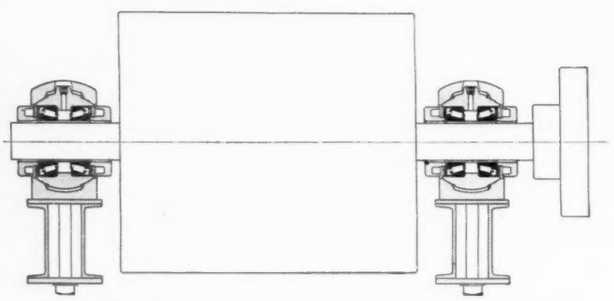


Fig. 3. Bearing mounting for conveyor head or tail pulleys.

acteristics and requirements of crushers are somewhat similar to those of conveyors. It goes without saying, therefore, that the results obtained from the use of anti-friction bearings are also comparable. Roller bearings have been successfully applied to several different types of crushers, including hammer-mill and jaw varieties. Since the operating characteristics and consequently the method of mounting, differ considerably in these types, it may be better to consider them separately. Hammer-mill crusher requirements include continuous operation at fairly high speed, a fairly heavy, sustained load, together with a continuous succession of shock loads, and the necessity for holding the shaft in perfect alignment. The latter is of particular importance in this case because the clearance between the hammers and the breaker plates must be maintained at its original setting if the machine is to operate satisfactorily.

Fig. 4 shows a typical bearing arrangement as

developed for this particular variety of crusher. Two bearings per box are used at each end of the shaft, the boxes being independent of each other as far as adjustment is concerned. In each case the inner races of the bearings are pressed on the shaft, the inboard ones against a shoulder. Proper distance between the cones is maintained by a spacing ring. The outer races are given a light fit in the housing, and the whole assembly is set up by means of shims between the outboard bearing and the housing. It is further set in place by means of a plate on one end of the shaft and a sleeve between the outer cone and the pulley on the other end. Both boxes are made self-aligning by means of spherical seats, a feature provided to compensate for possible inaccuracies in machining or failure to level completely during installation. Also, one end of the shaft is fixed, while the other is allowed to float to take care of possible shaft expansion. The net result is that the original rigidity of the mounting will not be affected to any appreciable extent by the shock loads and vibration to which it is subjected in service.

In jaw crushers, conditions are different. The question of taking care of shock loads is not so prominent, but there is a heavy pressure load on the bearings that rises periodically to considerable peaks. And there is an equally heavy unbalanced load due to the eccentric action of the pitman. A typical mounting developed for this particular service is shown in Fig. 5. In reality, there are two separate mountings on the same shaft, one for the shaft proper, and the other for the pitman bearing. Each pedestal mounting consists of a double-row bearing, the inner races being pressed on the shaft and the outer races mounted in a cartridge. It will be noted that the mounting at one end is fixed while, at the other end, a certain amount of float is permitted between the cartridge and the pedestal proper. The bearings are adjusted by shims between the cartridge and the outer closure. The pitman bearings also are of the double-row type, of capacities that will provide an ample factor of

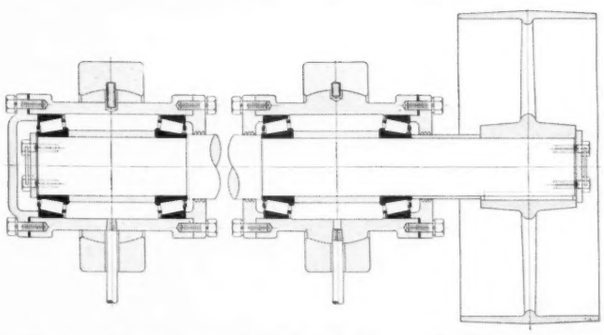


Fig. 4. Bearing mounting for a hammer-mill crusher shaft.

safety under any conditions of load liable to arise. In this case also the outer races are mounted in cartridges, and the same sort of shim adjustment is used as for the pedestal bearings. The assembly at one end is fixed while a certain amount of float is permitted at the other. This provision for lateral movement is made for two purposes to take care of possible shaft expansion and to compensate for inaccuracies in machining. One other feature is worthy of note, namely, the ease with which disassembly can be accomplished. This is necessary in machines of this character, whose parts must be repaired or replaced with a minimum loss of time.

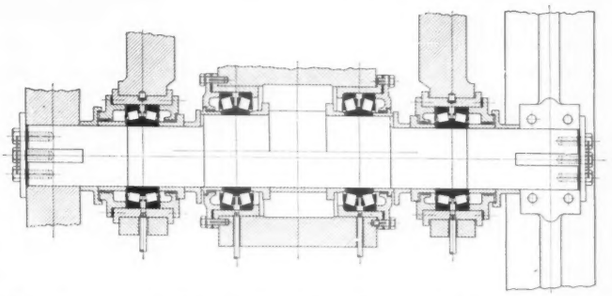


Fig. 5. Bearing lay-out for jaw crusher, showing alternative methods of mounting above and below.

It has been found, with both types of crusher, that anti-frictionizing not only cuts down the power demand considerably but increases the rate of production. With hammer mills this is possible because of the greater shaft speed permitted which naturally increases the striking force of the hammers. As a result, the rock is crushed finer and

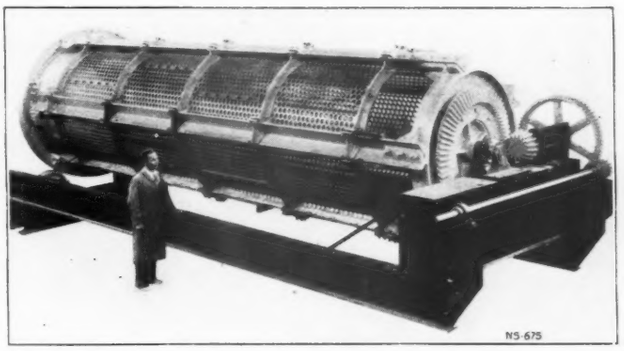


Fig. 6. Large revolving screen having shafts and trunnion rollers mounted in tapered roller bearings.

with greater rapidity. As to jaw crushers, experience in one comparative test brought out some interesting facts. At a speed of 250 r.p.m., the power required by a plain-bearing crusher averaged 45 hp. and the output 17 tons per hour. With a roller-bearing-equipped crusher of the same capacity, doing the same sort of work, the speed was 350 r.p.m., the power demand about 16 hp., and the output from 22 to 25 tons per hour. To sum up, the anti-frictionized machine showed an increase of 47 per cent in output at a saving of about 60 per cent in power. These figures do not take into account the savings in lubricant, in maintenance and in upkeep that were also effected, but these were doubtless proportional. So, it is easy to see that the use of roller bearings in this sort of equipment is bound to have good results.

Sorting and Cleaning Equipment

The different classes of equipment in this category, which includes rotary sorting and washing screens, scalping screens, vibrating screens and re-

washers, have, at one time or another, been anti-frictionized. From a bearing standpoint, the rotary screens probably have the most exacting requirements and therefore present the most difficult problems. They are characterized, as a class, by heavy, sustained radial loads and superimposed fluctuating loads caused by the tendency of the material to climb up the side of a screen and then to fall back against the direction of rotation. In most of these screens, in which one end is carried on two trunnions and the other on a single support (Fig. 6), there is also a thrust load which is particularly heavy at the discharge end. This load arises from the fact that the axis of the screen slants downward toward that end.

Mountings that are simple but quite effective have been developed for this service. The mounting that is typical of trunnion rollers is shown in Fig. 7. Two bearings are mounted on each shaft, the outer races being pressed into the roller hub, and the inner ones given a light fit on the shaft. The bearings are set up with spacers between the cones and the trunnion brackets. The whole mounting is inexpensive but more than strong enough for the service.

The support at the other end—usually the drive

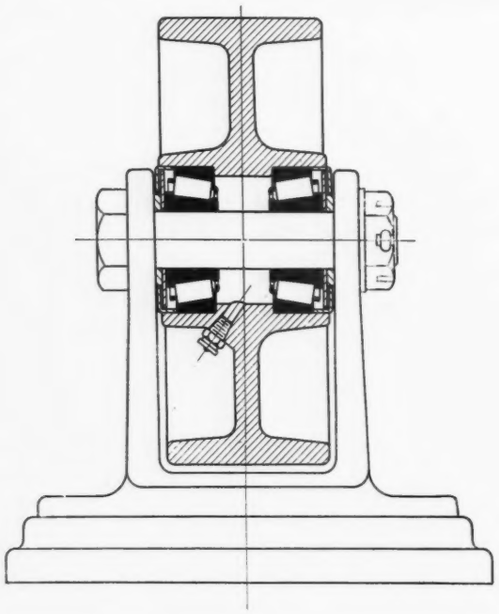


Fig. 7. Bearing mounting typical of the arrangement used with trunnion rollers.

end—usually consists of some variety of self-aligning pillow block of a construction similar to that shown in Fig. 8. The bearings are so mounted as to hold the shaft rigidly in alignment and are usually selected with sufficient thrust capacity to take care of any eventualities. Where back-shafts are used in the construction, it is becoming good practice to mount them in roller-bearing pillow blocks, to preserve their alignment and reduce the friction. The same is true of vibrating screen shafts where the vibration is imparted to the screen by means of eccentrics on a common shaft. Since not a great deal of the eccentric load is transmitted to the main-shaft bearings, no special provision need be made for it in the mounting.

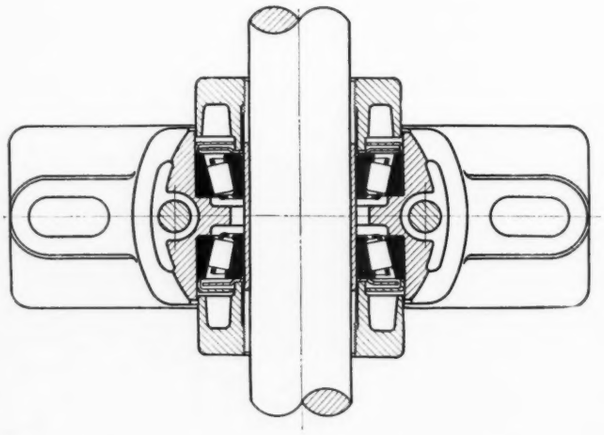


Fig. 8. Bearing mounting developed for pillow blocks.

Finally, there is the question of rewashers or any type of screw-feed machine used to separate fines from water and mud. The load problems in such a case are rather unusual in that there is a heavy, sustained, thrust load at one end of the shaft and a comparatively light radial load at the other. The former is caused by the back pressure set up by the action of the screw blades on the mixture of sand and water in the box and may rise to considerable amounts under certain conditions. The usual scheme of application consists in mounting a thrust bearing at the delivery end of the shaft, the arrangement being such that all of the thrust is absorbed by the bearing. Thus any possibility of lateral displacement of the driving gear or pinion is avoided. The other end of the screw is mounted in a standard radial bearing which merely serves to hold the shaft in proper position. In both cases the bearing closures are carefully designed to exclude all water or sand from the bearing chamber.

The general advantages accruing from the use of anti-friction bearings in this class of equipment correspond very closely to those outlined in the other cases. That is, a reduction in the power demand and a saving in the time, labor, and expense that must be devoted to maintenance. In fact, the same would hold true if further instances of anti-frictionization were to be included, such as motors, pumps, gear-drives, or other types of more or less accessory plant equipment. All of these have been anti-frictionized, for much the same reasons, and with precisely the same results as in the cases of the major apparatus.

The examples that have been given should serve to show how and why the anti-friction bearing is such a valuable agent for producing results in the effort for greater operating economy that forms so large a part of successful plant management.

MEN OF THE INDUSTRY

The portrait printed on this page in each number of PIT AND QUARRY is selected without significance as to current events or the position of the individual in the industry.

FLOYD MILLION
Million Sand & Gravel Co.
Lake Cicott, Ind.

Personal Mention

William McDonald, chief electrician of the Huron Portland Cement Co., spoke before the members of the Exchange Club of Alpena, Mich., on the evening of December 23. Mr. McDonald discussed the growth of the electric-power industry and its invaluable aid to the development of industrial America.

A. H. Long, superintendent of the Marblehead Lime Co. plant at Hannibal, Mo., has announced that the plant has been reopened after a 60-day shutdown.

George H. Rupp, who, since early 1929, has been in charge of iron mines and quarries of the Colorado Fuel & Iron Co., Denver, has been appointed manager of the newly created mining department. He will have charge of all iron-mine, coal-mine and quarrying operations. Before joining the Colorado company, Mr. Rupp was with the Hecla Consolidated Copper Co. He was graduated from the College of Mines of the University of Michigan in 1911.

Ralph W. Stone, of the Pennsylvania State Geological Survey, has returned to his headquarters at Harrisburg, Pa., after a two-months' stay in Colombia.

J. F. Gorman of Zanesville, O., was named president of the Ohio State Sand and Gravel Producers' Assn. at the annual meeting held at Columbus Dec. 18. **Albert E. Frosch** of East Liverpool, general manager of the Eastern Ohio Sand & Supply Co., was named secretary. About 60 members attended the gathering, held in the Neil House.

J. R. Cowan, manager of the Ross & Republic Marble Co. plant and quarry at Knoxville, Tenn., has become manager of the Virginia-Tennessee Marble Co. near Maryville, Tenn., succeeding **H. G. Keener.** Both companies are divisions of the Virginia-Alberene Marble Corp. of New York.

Eric E. Traversy, engaged in special work for the Portland Cement Assn. in Chicago and New York in recent years, has opened an office in the New Birks Building, 620 Cathcart St., Montreal, Quebec, for the promotion and advertising of engineering and building materials.

Edgar S. Ernst, chief chemist at the Dewey Portland Cement Co. plant at Davenport, Ia., has been named a member of the conservation committee of the Portland Cement Assn.

Fred J. Henson, formerly a field engineer attached to the Minneapolis office of the Portland Cement Assn. is now in England where he has joined Allied Cement Manufacturers, Ltd., with offices in London.

John T. Wilson is operating a quarry on his farm near Plymouth, Ill. The crushed limestone is of excellent quality and is marketed for highway construction.

A. W. Bass, who has been assistant to the vice-president of the Westinghouse Electric & Mfg. Co., East Pittsburgh, directing works records and statistics and also works accounting for the company and its subsidiaries, has been appointed director of budgets for the company.

Fred Chappell, formerly with the Georgia Peruvian Ochre Co., has been appointed superintendent of the Norristown, Pa., plant of Thompson, Weinman & Son Co., Inc.

F. W. Peek, Jr., has been appointed chief engineer of the Pittsfield, Mass., works of the General Electric Co., effective January 1, it has been announced by E. A. Wagner, manager of the works. Mr. Peek succeeds Giuseppe Faccioli, who retired a few months ago from active participation in the affairs of the company because of ill health.

Mr. Peek, who has been a consulting engineer of the company at Pittsfield, entered the General Electric Co. in 1905, following graduation from Leland Stanford University in the same year. When the consulting engineering department was formed by Dr. Charles P. Steinmetz in 1909, Mr. Peek was one of the first to join it. Since then he has done general consulting work on practical and theoretical engineering problems and research work. In 1911 he received the degree of Master of Electrical Engineering from Union College for work done in connection with high-voltage transmission.

Harry E. Brookby

Obituary

C. A. Simpler, vice-president of the Giant Portland Cement Co. died at his home in Philadelphia recently. Mr. Simpler was a native Pennsylvanian, having been born Nov. 27, 1869 at Williamsport.

Howard R. Connell, for 22 years representative of the General Electric Co. at the plant of the Allegheny Steel Co., died suddenly at his home at Tarentum, Pa., Dec. 3, aged 48 years. He was a graduate of Syracuse University and became identified with the research laboratory of the General Electric Co. in 1906. Two years later he was put in charge of the company's laboratory at the plant of the Allegheny company at Brackenridge, Pa.

Harry E. Brookby, of Chicago and Evanston, Ill., well-known in the nonmetallic mineral industries, died recently. He was born, 47 years ago, in Lafayette, Ind. In 1903 he graduated in engineering from Purdue University and soon specialized in the lines which retained his interest to the end. It was not until years later—during the World war—that he discarded his German family name, Bachtenkircher, and assumed the surname Brookby. He entered the lime industry and was a frequent speaker at meetings of the National Lime Manufacturers Assn. which later became the National Lime Assn. As manager of the Dolese & Shepard Co.'s lime plant, Chicago, and general superintendent of the Chicago Lime Co., he specialized in the hydration of lime which was then a new product. Later he conducted research for the Louisville Cement Co. in developing Brixment, a masons' cement. His bent for research next led to a connection with the United States Gypsum Co. While serving as manager of this company's research department and as production manager, he developed and patented numerous new products whose success later effected his election to the board of directors. Some years ago he entered upon an independent consulting and research practice, with such clients as the Bessemer Limestone & Cement Co., the Century Cement Co. and the Western Lime & Cement Co. He had membership in numerous engineering, scientific and social organizations. His death followed an operation for cancer.

Financial News

The information contained in these financial pages is given with the understanding that any statement on the part of this magazine or any of its staff, as to the responsibility or standing of any person, firm or corporation, or as to the value of any property or securities is a mere expression of opinion, given as a matter of service to the readers of PIT AND QUARRY, *for which no responsibility in any way is to attach to this magazine or to any of its staff.*

National Gypsum Pays Its Regular Dividend

Directors of the National Gypsum Co. have declared the regular quarterly dividend of $1 a share on the preferred stock, payable Jan. 2, to stockholders of record Dec. 22.

"Gross sales for the first 11 months were 10 per cent ahead of the same period a year ago, and earnings were in excess of preferred dividend requirements, in spite of the fact that the gypsum industry as a whole is suffering a severe depression," Melvin H. Baker, president, said.

"We have extended the distribution of our major items, plaster, wall board and lime, and have materially increased sales on the insulation board made by MacAndrews & Forbes, Camden, N. J., on which we took over the distribution this spring.

"The company is in strong financial position with ample cash resources and no bank loans. We expect better business generally after the first of the year, and anticipate satisfactory earnings in 1931."

Canada Cement Co., Ltd. Earnings Hold Up Well

The annual statement of Canada Cement Co., for twelve months ended November 30, 1930, reveals that the company had a good year despite general business depression in the Dominion. Increase in valuation of fixed assets, by nearly $1,000,000 from last year, reflects plant expansion during the period. At same time, working capital is shown at approximately the same level as in 1929, and earnings are reported only slightly below those of last year.

The company reports an operating profit for the twelve months of $3,132,150, against $3,171,115 the year before. Deductions were: Bond interest $1,098,166, against $1,100,000 last year; reserves $203,907, against $203,519, contingent reserve $250,000, unchanged from last year; preferred sinking fund $14,062, against $16,394. Thus the net income was $1,566,014, equal after preferred dividends to 34 cents a share on 600,000 shares no-par common, which compares with a 1929 net income of $1,600,701, or 39 cents per common share.

In the balance sheet, property valuation is increased to $39,897,498 from $38,988,475 last year. Current assets are reported at $5,539,852, against current liabilities of $1,781,107, leaving working capital at $3,758,745 compared with $3,903,759 year before.

Among current assets, inventories were $2,411,163, against $1,892,793. Higher figures were due to falling off in sales during latter part of fiscal period, decreased demand being most marked in smaller class of buildings and dealer trade. Receivables were $1,087,579, against $1,053,026; call loans $500,000, against $1,000,000; cash $1,206,670, against $1,233,885; government bonds and other securities $194,204, against $198,704.

In addition to sundry current assets, other assets included $6,097,783 investments, against $7,047,015 and deferred charges $87,094, against $112,659.

Current liabilities included $1,326,697 accounts payable against $1,130,515, last year, and accrued bond interest and preferred stock dividends totaling $454,409. Purchase money obligations (payable $300,000 a year for five years) are down to $1,200,000. Reserves total $1,169,228. Preferred stock outstanding has been reduced to $20,980,500 from $20,998,000, with preferred redemption account $19,500, against $2,000 last year. Bonds were reduced $400,000 to a total of $19,600,000. Common stock and surplus account is shown at $6,871,892, against $6,669,609, last year.

Four large new kilns, to replace eight smaller kilns, at the Montreal East plant, will be placed in operation next spring, which, with new grinding equipment, will reduce costs at this plant. A second self-unloading boat has been purchased by the company recently to operate on the Great Lakes.

Canada Cement, handling about four-fifths of the Dominion's cement business, will benefit from the large construction projects now under way, or contemplated. About 350,000 barrels of cement will be needed for the Montreal terminal of the Canadian National Railways, now in preliminary stages of construction; the Quebec government is going ahead with its program of new bridge construction and public works; large projects are contemplated all over Canada, with government assistance, as a means of relieving unemployment, and huge hydro-electric projects are under way or planned for the near future.

Asbestos Corp., Ltd. to Halt Interest Payments

Asbestos Corp., Ltd., has notified the Royal Trust Co. that interest will not be paid on first refunding mortgage bonds due January 1, and that a delay in interest will be asked for by the corporation. In anticipation of this step, a bondholders protective committee was formed last September which agreed to forego interest payments if 65 per cent of the bondholders approved. Less than 65 per cent of the bonds so far have been deposited.

CURRENT DIVIDENDS

Company	Class of Stock	Dividend Rate	Holders of Record	Payable	Company	Class of Stock	Dividend Rate	Holders of Record	Payable
Alpha Portland Cement	Preferred	1¾% qr.	Dec. 1	Dec. 15	Johns Manville	Preferred	$1.75 qr.	Dec. 11	Jan. 2
American Aggregates	Preferred	1¾% qr.	Dec. 20	Jan. 2	Johns Manville	Common	$0.75 qr.	Dec. 25	Jan. 15
Boston Sand and Gravel	Preferred	$0.87½ qr.	Dec. 22	Jan. 2	Kelley Island Lime & Transport	Common	$0.62½ qr.	Dec. 20	Jan. 2
Boston Sand and Gravel	Common	$0.40 qr.	Dec. 22	Jan. 2	Kentucky Rock Asphalt	Common	$0.40 qr.	Dec. 15	Jan. 2
Calaveras Cement	7% Pfd.	1¾% qr.	Dec. 30	Jan. 15	Lawrence Portland Cement	.....	1% qr.	Nov. 31	Dec. 15
Canada Cement	Preferred	1⅝% qr.	Nov. 28	Dec. 30	Medusa Portland Cement	Preferred	1½% qr.	Dec. 24	Jan. 2
Cleveland Builders Supply	Common	$0.50 qr.	Dec. 15	Jan. 2	Medusa Portland Cement	Common	$1.50 qr.	Dec. 24	Jan. 2
Consolidated Okla. Sand and Gravel	Preferred	1¾% qr.	Dec. 27	Jan. 2	Metropolitan Paving Brick	Preferred	$1.75 qr.	Dec. 15	Jan. 2
Consumers Co	Pr. Pfd.	$1.50 qr.	Dec. 15	Jan. 2	Newaygo Portland Cement	Preferred	$1.75 qr.	Dec. 26	Dec. 30
Coronet Phosphate Co	.....	$2.00 qr.	Dec. 14	Jan. 2	New York Trap Rock	Preferred	$1.75 qr.	Dec. 20	Jan. 2
Dolese and Shepard	.....	$2.00 qr.	Dec. 20	Jan. 2	Peerless Cement	Preferred	$1.75 qr.	Dec. 20	Jan. 2
Dufferin Pav. and Crushed Stone	7% Pfd.	1¾% qr.	Dec. 17	Jan. 2	Pennsylvania Salt	Common	$1.25 qr.	Dec. 30	Jan. 15
General Asphalt	Common	$0.75 qr.	Dec. 1	Dec. 15	Santa Cruz Portland Cement	.....	$1.00 qr.	Dec. 24	Jan. 2
Giant Portland Cement	Preferred	$1.75 S.A.	Dec. 5	Dec. 15	Sterling Salt	Common	$0.50 qr.	Dec. 24	Jan. 2
Gypsum, Lime & Alabastine of Canada, Ltd.	Common	$0.20 qr.	Dec. 24	Jan. 2	Superior Portland Cement	Class A	$0.27½M	Dec. 23	Jan. 2
Ideal Cement Co	Common	$1.75 qr.	Dec. 13	Jan. 2	United States Gypsum	Preferred	$1.75 qr.	Dec. 15	Dec. 30
Illinois Brick	.....	$0.60 qr.	Jan. 2	Jan. 15	United States Gypsum	Common	$0.40 qr.	Dec. 15	Dec. 30
International Cement	Common	$1.00 qr.	Dec. 11	Dec. 30	United States Gypsum	Common	$0.50 extra	Dec. 15	Dec. 30
International Salt	Common	$0.75 qr.	Dec. 15	Jan. 2	Warner Co	1st Pfd.	$1.75 qr.	Dec. 15	Jan. 2
					Warner Co	2nd Pfd.	$1.75 qr.	Dec. 15	Jan. 2
					Warner Co	Common	$0.50 qr.	Dec. 30	Jan. 15
					Worcester Salt	7% Pfd.	$1.75 qr.	Dec. 26	Jan. 2

Traffic News and Comment

New Complaints Filed

Sand and Gravel

Unreasonable rates and undue prejudice are alleged on sand and gravel from LaGrange and Reading, Mo., to destinations in Illinois, undue preference being shown competing shippers in Illinois and Iowa. Complainants have asked for reasonable rates and reparation in I. C. C. docket No. 24,099, Missouri Gravel Co., Lagrange, Mo., v. C. B. & Q. Ry., et al.

Recent I. C. C. Decisions

Cement

The findings of the commission in the Kansas-Missouri cement cases will make numerous changes in the rates on cement from producing points in Kansas and Missouri to destinations in Missouri. Rates from Missouri points were found to be unduly preferential to Missouri mills to the disadvantage of competing mills in Kansas. The present grouping of points in Kansas called the gas-belt group, was upheld by the commission. Destinations were divided into territories and rates found to be reasonable will be rates shown in cement scale 2 in Western Cement Rates, 69 I. C. C. 644, page 658, plus existing arbitraries for short or weak lines from Iola, Bonner Springs, Chanute, Humbolt, Mildred, Independence and Fredonia, Kan., and Dewey, Okla., to destinations in present scale-3 territory in Missouri which lie on and north of a line following the line of the Frisco Ry. from St. Louis to Pacific, Mo., thence the line of the M. P. Ry. to Labadie, Mo., and thence the line of the Rock Island Ry. to Kansas City, Mo.; and that reasonable rates to destinations in no-scale territory may not exceed the rates based upon cement scale 3 in Iola Cement Mills Traffic Assn. v. A. W. Ry. Co., 87 I. C. C. 451 page 466, plus existing arbitraries for short or weak lines. Reparation was denied. Intrastate rates in Missouri will be in violation of section 3 to the extent that they are on a lower basis than the rates prescribed for interstate movement. No fourth-section relief was granted but defendants will be permitted to hold the border-point rates as maxima at more distant points in the lower-rated territory. I. C. C. dockets: No. 17,854, Iola Cement Mills Traffic Assn. et al. v. A. T. & S. F. Ry. et al; No. 17,854 Sub. 1, Fredonia Portland Cement Co. v. A. T. & S. F. Ry.; No. 18,299, Kansas Portland Cement Co. v. A. T. & S. F. Ry.; and No. 18,264, Lehigh Portland Cement Co. v. A. T. & S. F. Ry.

The rates on cement from Monolith, Cal., to Las Vegas, Nev., and to other points in Nevada and Utah have been found unreasonable and unduly prejudicial. The reasonable rate to Las Vegas will not exceed 30½c, and to other points may not exceed the rates contemporaneously applicable from Los Angeles, Colton and Crestmore, Cal. The new rates are to be in effect not later than March 4, 1931. I. C. C. docket No. 23,092, Monolith Portland Cement Co. v. A. T. & S. F. Ry., et al.

Examiner's Reports

Cement

Examiner W. B. Butts recommends reparation of $414.06 on finding that the rate on cement from Alsen, N. Y., to Newark Heights, N. J., was unreasonable to the extent that it exceeded 12½c. I. C. C. docket No. 23,723, North American Cement Corp. v. C. of N. J. Ry., et al.

Moulding Sand

The rate on moulding sand from Sandale, Ind., to Knoxville, Tenn., was $2.93 while the rate from Hardy, Ind., was $2.68. Examiner Garofalo proposes that the rate from Sandale is unreasonable to the extent that it exceeds $2.68, and that an award of reparation be granted. I. C. C. docket No. 23,421, Fulton Sylphon Co. v. C. N. O. & T. P. Ry., et al.

Sand and Gravel

Examiner H. M. Brown proposes that the rate on sand and gravel from Johnsonville, Tenn., to Glasgow, Ky., is not unreasonable and that the case be dismissed. I. C. C. docket No. 23,668, T. L. Herbert & Sons v. L. & N. Ry., et al.

Rate Committee Dockets

Shippers are proposing that section 1 of rule 10, page 7 of Consolidated Freight Classification No. 6, be changed by eliminating the phrase "applicable to the official classification." They want section 2 eliminated and the folowing paragraph added to the note following section 3: "The charges on each separate carload will be based upon the carload rate applicable to the highest classed or rated article therein, and the carload minimum weight for each separate carload will be the highest provided for any of the articles in each separate carload."

It is proposed to eliminate sections 3(a) and 3(b), and to add a two paragraph note to section 4 reading, "(a) Articles included in mixed-carload shipments on which less-than-carload rates are applied under authority of section 4 will not be subject to the penalty rates, prescribed by rule 5 of the classification, for failure to conform to less-than-carload packing requirements for such articles. (b) If the articles as loaded in the car are in packages or shipping forms for which specific less-than-carload rates are provided, the rates to be applied thereon shall not exceed those which would be applicable under paragraph (a) hereof had the articles been loaded in the car loose." Subject Nos. 60 and 139.

It is proposed to add the following classification on lime (common, hydrated, quick or slacked), item 5, page 306. "In four-ply multiple-wall paper bags for shipments not exceeding 50 lb., see rule 40, section 10(c), L. C. L., 4th class in all territories." Subject No. 137.

Readers desiring to submit arguments either for or against these proposals should mail four copies of their letter to the nearest office of the Consolidated Classification Committee. Offices are maintained at Atlanta, Ga., Room 1015, 101 Marietta St.; New York, N. Y., Room 408, 143 Liberty St.; and Chicago, Ill., Room 404, Chicago Union Station.

SOUTHERN FREIGHT ASSN.

Lime

It is proposed to revise the rates on lime, carload min. wt. 30,000 lb. and 50,000 lb., from Leeds, North Birmingham and Phoenixville, Ala., to points of destination to which rates are published in Agent Glenn's I. C. C. A-684 from Alabama Group as follows: Apply Alabama Group point rates to points over 100 miles from Leeds, Birmingham and Phoenixville; to points less than 100 miles, to which rates are presently published from Alabama Group, the scale shown in section 8 of above tariff for actual distance from each point. Docket No. 53,211.

WESTERN TRUNK LINE ASSN.

Mixed carloads of cement, lime, plaster and stucco from Mason City, Linwood and Des Moines, Iowa, to destinations in Nebraska are now governed by item 565A, W. T. L. Tariff 207, which reads, "Apply on the cement, the carload weight at actual weight but not less than 50,000 lb.; and on the lime, plaster and/or stucco, actual weight on each subject to the straight carload rate applicable to each." It is proposed to include in item 105 of W. T. L. Tariff 133G, the state of Nebraska as destination territory, thereby establishing the following rule: "Apply on the cement the carload cement rate at actual weight, but not less than 50,000 lb.; and on the lime, plaster and/or stucco, actual

weight, a rate 3 cents per 100 lb. higher than the rate charged on the cement. Docket No. 5,645-B.

Plaster Board

It is proposed to establish on plaster board and plaster wallboard, carloads, from producing points in Western Trunk Line, Central Freight Assn., and Eastern Trunk Line territories, to points in Western Trunk Line Territory, rates based on 17½ per cent of the Southwestern first-class scale, which is similar to the basis prescribed under I. C. C. Docket No. 17,006. Docket No. 7,476.

Sand and Gravel

Shippers are asking for revision of rates on sand and gravel, carload min. wt. 90 per cent of the marked capacity of the car, except, when car is loaded to visible capacity, actual weight to apply but, in no case, shall the min. wt. be less than 40,000 lb. between points in Iowa and points in Minnesota. Rates sought by shippers are shown in the following scale and are per net ton, for miles shown or distances under those shown.

DOCKET No. 2,898-I

Miles	Single Line Rate	Joint Line Rate
40	$0.75	$0.90
50	0.80	0.95
60	0.85	1.00
70	0.90	1.05
80	0.95	1.10
90	1.00	1.15
100	1.05	1.20
110	1.10	1.25
120	1.15	1.30
130	1.20	1.35
140	1.25	1.40
150	1.30	1.45
160	1.35	1.45
170	1.40	1.50
185	1.45	1.55
200	1.50	1.60
230	1.55	1.65
260	1.65	1.75
290	1.75	1.85
320	1.85	1.95
350	1.95	2.00

SOUTHWESTERN BUREAU

Cement

Shippers who contemplate the erection of a cement plant at Tulsa, Okla., find that, generally, there are no through commodity rates on cement to the territory they wish to cover and, in various dockets, are asking for rates which will put Tulsa on the same scale of rates as currently published from Ada, Okla., the c. l. min. wt. to be 50,000 lb. To Alabama, Arkansas, Kentucky, Louisiana, Mississippi and Tennessee, as per S. W. L. tariffs 168A and 169A, they want the scale 3 rates as per I. C. C. Docket 16,845. (Docket No. 21,799.) To points in Oklahoma they want scale 3 rates to scale-3 territory, and the average of scales 3 and 4 to scale-4 territory. (Docket No. 21,809.) To points in Texas they want scale-3 rates to scale-3 territory and scale-4 rates to scale-4 territory. Rates to apply to same territory as covered by I. C. C. dockets 15,151 and 20,821. (Docket No. 21,819.) To points in Missouri they want scale-2 rates to scale-2 territory and scale-3 rates to scale-3 territory, as described in I. C. C. docket No. 8-182. (Docket No. 21,834.) To points in Missouri in the so-called no-scale territory, on all lines south and east of the St. L. S. F. Ry. from St. Louis, Mo., to Springfield, Mo., they want scale-3 rates established. (Docket No. 21,856.)

Lime

The Missouri Pacific has recently published, in connection with the rates on lime, carloads, from Limedale Spur and Ruddells, Ark., a privilege of partial unloading in intermediate points at a charge of $6.30 for each stop. Producers at points on the N. C. & St. L. Ry. assert that a failure to obtain the same privilege will place them at a substantial disadvantage and are proposing that the privilege be accorded them at points in southwestern territory in order to meet the actual competition. Docket No. 21,785.

Limestone

A shipper at Glencoe, Mo., asks for an amendment to item 1105-F, W. T. L. Tariff 91-F, applying on agricultural limestone, carloads, between points in Missouri, by including therein Glencoe, Mo., a local point on the M. P. Ry., as a point of origin. A plant was recently established at Glencoe and is in readiness to make carload shipments, but the shipper contends that present rates are prohibitive and asks that Glencoe be placed on the same basis as Hannibal, Mosher and River Mines, competitive points. Docket No. 21,786.

Board Activities

Trans-Missouri-Kansas

Decreases in car loadings for the first quarter of 1931 below the first quarter of 1930, are expected on most commodities in the territory of the Trans-Missouri-Kansas Shippers' Advisory Board. Column (a) below represents the actual carloadings for the first quarter of 1930, column (b) the prospective loadings for the first quarter of this year and column (c) the percentage of decrease for 1931.

	(a)	(b)	(c)
Cement	9,402	8,864	5.7
Lime, plaster and gypsum	3,488	2,965	15.0
Stone, sand and gravel	27,801	27,801	...
All loadings	411,797	393,687	4.4

Atlantic States

The report of the Atlantic States Regional Advisory Board, shows an expected increase of 17 per cent in shipments of crushed stone for the first quarter of this year as compared with the first three months of 1930. Decreases shown in the report include cement, 10 per cent; gypsum, 8.4 per cent; limestone, 30 per cent; sand and gravel, 23 per cent; and slag, 37 per cent. No change is expected in the shipment of lime.

Pacific Coast Board

Members of the Pacific Coast Board meeting at San Francisco on December 12, were optimistic concerning general business conditions in that territory for the first quarter of this year. They anticipate that the carloadings of cement will be about the same as for the first quarter of 1930, and that loadings of stone, sand and gravel will be 43,712 cars, or an increase of 7.2 per cent.

Great Lakes Board

Prospective carloadings in the territory of the Great Lakes Board for the first quarter of 1931 are 361,657 cars or a decrease of 6.9 per cent from the actual loadings for the first three months of 1930, the largest decrease being automobiles, trucks and parts. In spite of this decrease there was a decided spirit of optimism displayed by the members at the meeting in Buffalo on December 18. Committee reports of estimated requirements for the first quarter and the relation to the actual loadings for the first quarter of 1930 include:

Stone, sand and gravel, 14,000 cars, 5.1% decrease.
Cement, 4,000 cars, 4.0% increase.
Lime and plaster, 10,000 cars, 5.3% decrease.

The commission has permitted the Lone Star Cement Co. of New York to intervene in I. C. C. docket No. 24,010, Glens Falls Portland Cement Co., v. B. & A. R. R., et al., reported on page 65, PIT AND QUARRY, Dec. 17, 1930.

New Corporations

TWIN CITY SAND & GRAVEL CO., St. Paul, Minn. Herman C. Wenzel, pres. $200,000.

STANDARD GRAVEL CORP., c/o Richard & Loveland, Ocean City, N. J. $150,000 pfd. 10,000 sh. com.

BITU-MIX CORP., c/o Blodgett & Stone, Schenectady, N. Y. 1,000 sh. com.

HOOSIER SANDSTONE CO. INC., Bedford, Ind. 1,000 sh. n.p.v. William Ingalls and R. O. Martin, Bedford; Samuel G. Fagan, Bloomington and Frank T. Brodix, Chicago.

GARDEN STATE SAND & GRAVEL CO. INC., 63 Morristown, Rd., Bernardsville, N. J. $50,000.

Creates New Department to Handle Foreign Work

A new division, to be called the foreign-relations department, has been instituted by the Hercules Powder Co., according to an announcement by President Russell H. Dunham. In charge of the new department will be Peter W. Meyeringh, until recently manager of the N. V. Hercules Powder Co. at Rotterdam, Holland.

The purpose of the new department, according to Hercules officials, will be to coördinate sales and the development of new business in foreign lands. Hercules products are now being distributed in many countries throughout the world, the company's export business amounting to more than 10 per cent of its total sales volume.

Review of Foreign Practice

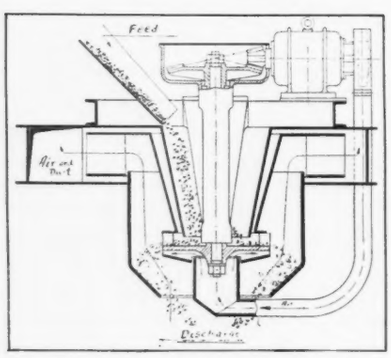
Gun Removes Rings from Linings of Rotary Kilns

A Magdeburg arms manufacturer has taken a patent in Germany on a device for shooting loose the ring deposits that form in the burning zones of rotary kilns through combination of the calcining material, and often ash, with the refractory lining.

The new German device, known as the *Loesche canon*, mounted on a sturdy but portable carriage, introduces a charge of smokeless powder into the ring and explodes it with tremendous force. It is said to be a big saver of time and expense over any other method of removing these formations.—*Zement* 19:963-4, Oct. 9, 1930, and *Tonindustrie-Zeitung* 54: 1332, Oct. 20, 1930.

Compressed Air Used for Removing Dust in Stone

The author of this article describes a device invented by himself for removing the dust from the smaller sizes of crushed stone by means of compressed air, producing a material practically free from the dust-fines which cannot be removed in the usual screening process. The stone is fed into it by an elevator from the crusher and is spread over the largest possible area by a rotating table so as to offer a maximum contact with the air current which it meets in dropping off the edge of the table into the discharge chamber. A further cleansing is afforded by the use of a large fan which exhausts from the machine more air than the compressed-air tubes bring in. The stone passing through this machine is wholly clean and cannot be distinguished from stone that has been washed. The process is, of course, far more powerful than the dust-collectors used around many stone plants because the latter naturally do not carry the air into such intimate contact with the stone nor at as high speed. With this device there must be some provision for separating the dust from the air, and this can be done most simply in a large dust-bin where the air loses its velocity and drops most of the dust particles.



Device for cleaning fine stone by compressed air.

Material processed in this way is superior to the ordinary fine stone that consists of screenings from the larger commercial sizes, and is particularly valuable for aggregate in bituminous mixtures because its freedom from dust gives it a much improved binding strength. For this purpose it is also superior to washed stone because stone, once washed, is never again wholly dry unless put through a drying process; also, it is considerably more convenient than washing in the many plants where water supply is a difficult problem.—Oskar Kamphengel in *Steinindustrie* 25:348-9, Oct. 30, 1930.

Proposals for Testing Lime Used in Plaster

Lack of recognition of objective methods of test for plastering limes leads to many inconveniences, and such methods should be developed and adopted for the separate requirements of fineness, specific gravity, plasticity, soundness (constancy of volume), adhering strength, and resistance to cracking. In fineness, a residue of 10 per cent on a 900-mesh sieve does not seem permissible; it seems rather that there should be no residue on a 900-mesh screen. This, as well as specific gravity, are well covered by existing tests for building lime. A method of testing the plasticity might be to borrow a measure of consistency from the testing of cement mortars and to determine the greatest admixture of sand with which a lime of given plasticity would still form balls rolled between the hands and preserve an even surface; the index figure would thus indicate the greatest number of parts of sand per unit of lime which would still give a plastic mortar.

Tests for building lime for constancy of volume seem appropriate for application to plastering limes. In testing for adhering strength by methods carried over from the testing of cement mortars, there is some question whether, in the case of lime plaster, it is more useful to determine the adhesion to two rock surfaces bound together by standard mortar or at right angles to the mortar joint. In most cases one probably will have determined the shear or tensile strength, as certainly the mortar almost always breaks before it separates from the masonry; one can only say that the adhering strength is greater than the shear or tensile strength. For the sixth requirement, resistance to cracking, it is to be remarked that the determination of tensile or compressive strengths of plastering mortars has no purpose but that the resistance to mechanical actions should be determined. For this it would be possible to use a device on the order of the Vicat needle to determine the resistance of a specific mortar of a certain age to the penetration of a chosen series of points. With certain changes, the chisel device of the Chemische Laboratorium fuer Tonindustrie could also be used for this test.

The determination of minimum values for these different requirements must be made on the basis of a series of tests on plasters which have adequately demonstrated their suitability for use.—Dr. Otto Friz in *Tonindustrie-Zeitung* 54:1097-8, Aug. 21, 1930.

An Electrical Device for Thawing Out Dynamite

As is well known, dynamite will freeze at temperatures lower than 11 deg. C. and, below 8 deg. C., will freeze rapidly. As dynamite, while normally plastic, is hard and stiff when frozen and cannot be used in that condition for blasting, it must be thawed out before use. This must naturally be done with due care, and thawing in warm places is to be strictly avoided. The best and safest way to thaw dynamite is to put the frozen cartridges in a watertight container and set this container in another that is filled with warm water. This has the disadvantage that the warm water quickly cools and must be replaced with more warm water, requiring a great deal of labor and attendance. This objection is overcome by an electrical device of the Austrian Siemens-Schuckert Works of Vienna, which consists of two vessels, one of which holds the frozen dynamite and the other holds the water and has a double bottom with an electric heating element. Depending on the surrounding temperature, the heating of the water to about 25 to 30 deg. C. requires two to three hours. Thereafter the heating progresses more slowly, reaching a maximum temperature of 60 deg. in nine hours. Since temperatures greater than this have a possibility of discharging the dynamite, the electric heating device is built so that that temperature will not be exceeded, as long as there is water in the vessel. In practice, it is actually better to keep the temperature below the maximum possible, say about 40 deg. on an average. The time required depends on the degree of freezing and the amount of dynamite in the inner vessel. In one experiment reported, 75 kg. of hard frozen dynamite was thawed out thoroughly in 16 hr., with a maximum temperature of 40 deg.—*Steinindustrie* 25:380, Nov. 27, 1930.

Recent Patents

AMERICAN

Cement

Method of producing ground raw material for Portland-cement manufacture. John A. Miller, Nazareth, Pa., and Edmund P. Newhard, Kingsport, Tenn. No. 1,784,462.

Process of manufacturing Portland cement. Guy S. LaForge, Union Bridge, Md. No. 1,784,840.

Method for producing cement. Elias R. Wilner, New York, N. Y., assigner to Eddystone Cement Corp., same place. No. 1,785,508.

Cement manufacture. Ray C. Newhouse, Wilmette, Ill. No. 1,786,080.

Concrete

Concrete mixer. Charles K. Marks, Womelsdorf, and Walter G. Weinhold, Shillington, Pa. No. 1,784,371.

Crushing and Grinding

Pulverizing mill. Fred J. Bullock, Shortsville, N. Y., assignor to Papec Machine Co., same place. No. 1,785,435.

Excavating

Direct bucket drive. Erich H. Lichtenberg, Milwaukee, Wis., assignor to Koehring Co., same place. No. 1,785,031.

Scraper-bowl construction. William J. Adams, Santa Cruz, Cal., assignor to Ball Wagon Grader Co., Stockton, Cal. No. 1,785,106.

Mining machine. Morris P. Holmes, Claremont, N. H., assignor to Sullivan Machinery Co., same place. No. 1,785,196.

Portable cableway. Joseph H. Dickinson, Winter Park, Fla., and Merian H. Dickinson, Seattle, Wash., assignors to Lidgerwood Mfg. Co., Elizabeth, N. J. No. 1,785,340.

Excavating machine. Roberto Kurtz, Buenos Aires, Argentina. No. 1,785,353.

Back digger. Arthur Orloff, Green Bay, Wis., assignor to Northwest Engineering Corp., same place. No. 1,785,492.

Earth-excavating machine. Adam Clark, Willows, Saskatchewan, Canada. No. 1,786,335.

Material Handling

Mine-car. Victor Willoughby, Ridgewood, N. J., assignor to American Car & Foundry Co., New York, N. Y. No. 1,784,472.

Mine-car. Victor Willoughby, Ridgewood, N. J., assignor to American Car & Foundry Co., New York, N. Y. No. 1,784,473.

Mine-car. Leopold Almquist, Jersey City, N. J., assignor to American Car & Foundry Co., New York, N. Y. No. 1,784,477.

Means for elevating pulverulent materials. Theodore J. Tellefsen, Cincinnati, O., assignor to J. H. Day Co., same place. No. 1,785,604.

Mining

Mining machines. Morris P. Holmes, Claremont, N. H., assignors to Sullivan Machinery Co., same place. Nos. 1,785,957 to 1,785,961, inclusive.

Mining machines. Charles F. Osgood, Claremont, N. H., assignor to Sullivan Machinery Co., same place. Nos. 1,785,973 and 1,785,974.

Mining machine. Cornelius G. Boudette, Claremont, N. H., assignor to Sullivan Machinery Co., same place. No. 1,786,225.

Mining machines. Morris P. Holmes, Claremont, N. H., assignor to Sullivan Machinery Co., same place. Nos. 1,786,243 and 1,786,244.

Mining apparatus. Charles F. Osgood, Claremont, N. H., assignor to Sullivan Machinery Co., same place. No. 1,786,259.

Screening

Rotary grizzly. Albert J. Meyers, Pittsburgh, Pa., assignor to Koppers Co., same place. No. 1,785,841.

FOREIGN

Blasting

Cartridge for blasting stone. Siemens & Halske Akt.-Ges. German 514,338.

Cement and Concrete

Process for manufacture of reinforced concrete. E. Freyssinet and J. Seailles. British 338,934.

Mixing device for the production of a foamy mass from cement, water and a foam-producing substance. George Boole Hinton. German 514,144.

Device for slaking the superfluous calcium oxide contained in cement or clinker. Arturo Malignani and Camillo Malignani. German 514,474.

Hydraulic cement. Joseph T. Goddard. Canadian 306,832.

Process for the manufacture of fused cement. B. Bruhn. French 697,673.

Process for simultaneous manufacture of iron or of its products and Portland cement or hydraulic lime. L. P. Basset. French 697,952.

Crushing and Grinding

Tube mills. J. R. Kueneman. British 317,769.

Grinding rolls. O. Waldrich. British 339,168.

Crushing device. Soc. Anon. d'Entreprise Generale de Travaux Engetra. German 514,290.

Single-roll crusher. Firma J. M. Lehmann. German 514,291.

Pulverizing machine. Chauffe & Combustion Soc. Anon. Canadian 306,737.

Grinding mill. Alfred Erasmus Geoffrey MacCallum. Canadian 306,888.

Drilling

Rock-splitting apparatus. L. T. Beck. British 338,583.

Rock drills. H. S. Potter. British 338,792.

Precussive hand tools. L. Fluhr and A. Verhaar. British 338,884.

Portable devices for compressing air or actuating cutting or other tools. L. Hartridge. British 339,101.

Hollow drill steel. Frederick Felix Gordon. Canadian 306,662.

Rock drill. Kenneth M. Perry. Canadian 306,687 and 306,688.

Driers

Driers and process for operating same. A. E. White (Coe Manufacturing Co.). British 338,585.

Method of drying wet materials. Aktiebolaget Fribergs Hogracuumpump. Canadian 306,722.

Excavators

Excavators. J. S. Withers (Koehring Co.) British 338,942.

Firing

Burners for pulverized materials. H. Nielsen and B. Laing. British 338,542.

Burners for pulverized fuel. Clarke, Chapman & Co. Ltd. and W. A. Woodeson. British 339,010.

Gypsum

Gypsum kiln with two calcining tubes, one behind another. Andre Bourdet. German 514,068.

Kilns

Tunnel kilns. Woodall Duckham (1920) Ltd. and A. McDougall Duckham. French 697,639.

Vertical kiln. N. V. Silica en Ovenbouw Maatschappij. French 697,680.

Device for strengthening the draft in the ring kiln and cooling the unloading chamber. Gustav Schroeder. German 514,386.

Lime

Process of improving the working of lime and dolomite calcining kilns. W. Voss and Vulcan-Feuerung Akt.-Ges. British 339,105.

Magnesia

Process for the manufacture of mortars, artificial stones and the like from magnesite or magnesia. Soc. Anon. pour l'Industrie de la Magnesite (Succursale de Hongrie). French 697,898.

Process for utilization of waste from artificial stone plants containing magnesia cement. Alexander Staege. German 514,710.

Material Handling

Method of treating leather, particularly for ore conveyor belts. H. McLennan. British 338,536.

Belt conveyors. T. G. Nyborg and M. F. Higgins. British 338,605.

Loading and dumping systems for ropeways. Adolf Bleichert & Co. Akt.-Ges. British 338,782.

PIT AND QUARRY *will furnish, at its actual cost, a copy of any patent cited here. A charge of ten cents per copy is made by the U. S. Patent Office, Washington, D. C., and readers may procure a copy directly by addressing the Commissioner of Patents, with payment for copies requested. Postage stamps are not accepted by the Patent Office. We will endeavor to obtain copies of foreign patents for our readers but we cannot give assurance in every case for the reason that copies of such patents are not printed for distribution as liberally as are the American copies, nor is there a fixed charge per copy.*

Wire conveyor belts. Wickwire Spencer Steel Co. British 338,951.

Apparatus for lifting and dumping railway cars. B. E. Ellson. British 339,064.

Conveyor. G. Polysius Akt.-Ges. German 514,069.

Device for loading ships. Firma Arnold Bernstein. German 514,145.

Conveyor bridge for removing overburden. Mitteldeutsche Stahlwerke Akt.-Ges. German 513,923.

Conveyor drive. Froelich & Kluepfel Maschinen-fabrik. German 514,-580.

Roller for conveyors. David T. Evans. Canadian 306,654.

Conveying apparatus. The Insulite Co. Canadian 306,983.

Crane. Demag Akt.-Ges. French 697,666.

Loading shovel for automatic recovery of material from piles. Preparation Industrielle des Combustibles (Soc. Anon.). French 697,989.

Mixers

Mixing apparatus. J. A. Pickard. British 338,945.

Mixing trommel for building materials. Fritz Kirch. German 514,-067.

Mixer. Koehring Co. German 514,385.

Sacking

Multi-wall bag and method of making the same. St. Regis Paper Co. British 318,527.

Separating

Method of and apparatus for treating flue and like gases with the object of removing therefrom objectionable solid or gaseous products. P. J. Robinson. British 338,492.

Screening apparatus. G. C. Oakes and Ransome, Sims & Jeffries Ltd. British 338,608.

Screening apparatus and the like. General Electric Co. Ltd. and W. S. Edwards. British 338,651.

Screening device. Hermann Hildebrandt. German 513,978.

Separating device for solids and liquids. Wigan Coal & Iron Co. Ltd. Canadian 306,813.

Process and apparatus for separating substances of different specific gravity. Fritz Arledter. Canadian 306,844.

Silica

Eliminating the silica in the treatment of natural silicates with acids for the purpose of rendering soluble some of their constituents. F. Jourdan. British 339,028.

Unclassified

Process of making hydraulic mortar and the constituent parts thereof, and the products of such processes. W. Reismann, R. H. Schloss and W. H. Evers. British 338,664.

Covering wire netting with solidifying concrete, clay or other setting masses for the production of petrified wire gauze serving as carrier for plaster. C. Schroeder, Sr. British 338,-755.

Coming Events

Jan. 19-22, 1931, St. Louis, Mo. Annual Convention National Crushed Stone Assn., Hotel Jefferson. J. R. Boyd, secretary, 1735 14th St., N. W., Washington, D. C.

Jan. 26, 1931, St. Louis, Mo. Annual convention of National Ready-Mixed Concrete Assn. New Hotel Jefferson. J. C. Eakin, secretary, Little Rock, Ark.

Jan. 27-29, 1931, St. Louis, Mo. Annual convention National Sand & Gravel Assn., Hotel Jefferson. V. P. Ahearn, executive secretary, Washington, D. C.

Feb. 10-13, 1931, Chicago, Ill. Fifth Midwest Power Engineering Conference. G. E. Pfisterer, secretary, 308 W. Washington St., Chicago.

Feb. 22-28, 1931, Cleveland, O. Congress and exposition under the sponsorship of the American Ceramic Society and in coöperation with the American Refractories Institute, the National Brick Manufacturers' Assn., the Chicago World's Fair Ceramic Assn., the Grinding Wheel Manufacturers' Assn. and the Feldspar Grinders' Institute. All meetings in Cleveland Auditorium. Exhibits in Cleveland, Statler and Hollenden Hotels.

Feb. 24-26, 1931, Milwaukee, Wis. Annual Convention, American Concrete Institute, Schroeder Hotel. Joint sessions with Concrete Masonry Assn. and Wisconsin Concrete Products Assn. Harvey Whipple, secy., 2970 W. Grand Blvd., Detroit, Mich.

Feb. 24-27, 1931, Wichita, Kan. Sixth Annual Southwest Road Show and School, Exposition Building. F. G. Wieland, manager, P. O. Box 1043, Wichita, Kan.

April 13-18, 1931. Cleveland, O. National Industrial Equipment Exposition, in connection with Congress on management, maintenance and materials-handling of A. S. M. E. G. E. Pfisterer, managing director, 308 W. Washington St., Chicago, Ill.

May 4, 1931. New York, N. Y. Thirteenth exposition of Chemical Industries, Grand Central Palace. International Exposition Co., managers, Grand Central Palace, New York.

Pumpings from the Old Pit

Excerpts from the old files of PIT AND QUARRY *reveal many interesting sidelights on the activities of the pits, quarries and plants of former days. These, interesting by comparison with practices in vogue today, are printed in this column each issue.*

Fourteen Years Ago

The sand-and-gravel operators of Chicago and the tributary territory were planning to meet and organize an association. The project had been under discussion for six months by a number of the operators, the initial move being made by The Atwood-Davis Sand & Gravel Co., Chicago, as host to nineteen other companies at a dinner the preceding July. The plans contemplated the creation of a freight-rate bureau and a uniform cost-accounting system.

Ten Years Ago

At the annual meeting of the Wisconsin Mineral Aggregate Assn., E. G. Brown of the Janesville Sand & Gravel Co., opened the program with four verses that refer to the propensity of sand and stone operators to fish. Following is the second verse:

"They're fishing all the winter for a chance to sell their wares;
They go fishing in the summer as a way to drown their cares;
For when the aggregation—and here's the thing that jars—
Have sold their stone and gravel, they never get the cars."

Five Years Ago

The National Crushed Stone Assn. was ready for its annual convention Jan. 18-21, 1926, at the Mount Royal Hotel, Montreal, Que. Addresses were to be delivered by many prominent Canadians and Americans. Among the entertainment features were music by the Highland Laddies bagpipe band, a smoker, a banquet, numerous luncheons, two sleighing trips, a toboggan party, and an ice-hockey game.

* * *

The program for its tenth annual convention was announced by the National Sand & Gravel Assn. The sessions were to be held Jan. 19-21, 1926, at the Atlanta-Biltmore Hotel, Atlanta, Ga. Gov. Clifford Walker of Georgia was scheduled to deliver the address of welcome. Attending ladies were to be entertained by the Atlanta Women's Club on a sight-seeing trip to Stone Mountain. An open forum on the last afternoon was slated to discuss numerous live topics such as demurrage on frozen shipments, best method for patching cars, split loads of sand and gravel, advantages of selling by the ton, elimination of irresponsibility, and efficient methods of washing.

Legal Information for Operators

Holds Railway Company Liable for Conversion

Generally speaking, a railway company is legally liable for conversion and is required to pay a shipper full value of shipped non-metallic products if delivery is made at the destination by the carrier's agent in violation of the terms of the bill of lading. Moreover, it is important to know that a legal delivery of shipped goods is made when the railway company's agent in any manner acquiesces in delivering the shipment.

For example, in Norfolk & W. Ry. Co. v. Aylor, 150 S. E. 252, it was disclosed that a seller consigned a carload of products to a purchaser. The shipment was on a uniform bill of lading and contained this provision: "The surrender of this original Order Bill of Lading properly indorsed shall be required before the delivery of the property. Inspection of property covered by this bill of lading will not be permitted unless provided by law or unless permission is endorsed on this original bill of lading or given in writing by the shipper."

The seller attached the bill of lading to a draft for $816, which covered the price of the goods and the freight charge, and sent the draft with the bill of lading attached to a bank with directions to notify the purchaser upon arrival.

The day following the arrival of the car at its destination the purchaser, without paying the draft, sent a drayman to unload the car. The drayman approached the railway company's agent and informed him that he had come for delivery of the shipment. The agent pointed to the car and said "It is that red car there," and then attended to other work. The drayman broke the seal of the car and took a load to the buyer who refused it and directed him to take it back and reload it on the car.

Afterwards the buyer "borrowed" the bill of lading from the bank, but he did not surrender or offer to surrender it to the railway agent but entered the car and inspected its contents. He refused to accept the goods on the contention that its quality was not satisfactory.

The seller sued the railway company for the value of the carload, contending that it was liable for conversion when its agent permitted the drayman to enter the car and later permitted the purchaser to inspect the merchandise on presentation of a borrowed bill of lading. It is interesting to observe that the Court held the railway company liable, and said:

"It is well established legally that a direction in a bill of lading or shipping receipt, to notify a certain person of the arrival of goods which are consigned to the order of the consignor or of a third person, does not justify the carrier in delivering the goods to the person whom it is directed to notify, without the production of the bill or shipping receipt properly indorsed; and, if the carrier does deliver the goods to him under such circumstances, it is liable for the value thereof to the holder of the bill or shipping receipt."

Rules on Mechanic's Lien in Gravel Co. Decision

The law is well established that compliance by a material man with a state mechanic's lien law is equivalent to the general contractor assigning to the material man the amount due from the owner. So held the higher Court in Stanfill v. Penniman Gravel & Material Co., 27 S. W. (2d) 135.

In this case it was shown that a property owner contracted with a general contractor for the erection of a building. Soon afterward the general contractor made a subcontract with a subcontractor by which the latter agreed to do the concrete work on the building. The subcontractor purchased from the Penniman Gravel & Material Co. materials which were used in performance of the subcontract. The subcontractor died after having, in the meantime, completed the subcontract but before paying for the materials purchased from the gravel company. The latter gave written notice to the owner of its claims and filed with the county clerk affidavits asserting its liens, in compliance with the state statutes. It was found that the subcontractor's estate was insolvent, that the owner owed the general contractor $696 and that the latter owed the subcontractor the same amount.

The owner paid the general contractor $696 and litigation developed over the question as to whether or not the material men, whom the subcontractor owed, were entitled to a lien on the building or to payment from the amount due the general contractor. In holding the material men entitled to either a lien or payment, the higher Court said:

"The defendants (material men), having complied with the statutory requirements in respect to the fixing of their material man's lien on the property of Hutton, the owner, they become entitled to the sum due by the latter, under the building contract, to the extent of their respective claims for material furnished to the subcontractor. . . . The statutes, when complied with, have substantially the same effect as a transfer of the obligation of the owner by the contractor to the material man to the extent required to pay the account for the material."

Consignee Entitled to Recover Excess Charge

It is settled that a consignee or purchaser of non-metallic products is not entitled to recover freight overcharges if the goods are shipped f. o. b. destination. If the goods are shipped f. o. b. the seller's plant, the purchaser ordinarily is entitled to recover excess freight charges from the transportation company. Moreover, if the goods are shipped f. o. b. the consignee's location, and the latter pays the excess freight charges, he is entitled to recover from the carrier notwithstanding the fact that the seller previously remits this amount to the consignee.

For instance, in Consolidated Cut Stone Co. v. A., T. & S. F. Ry. Co., 39 F. (2d) 661, it was disclosed that a stone company priced stone f. o. b. the quarry. The consignee paid to the railway company excess freight charges on shipments of stone, and sent these bills to the stone company which allowed the purchaser credit on his account for the amount of the total freight charges. Later the purchaser, consignee, sued to recover $21,818 from the railway company.

The counsel for the railway company contended that the purchaser was not legally entitled to recover the excess charges since it had been credited with this amount by the stone company. Notwithstanding this contention the higher Court held the consignee entitled to recover the excess charges, saying:

"The contention of the defendant (railway company) is bottomed upon the fact that, while the plaintiff (purchaser) paid the freight charges to the delivering carriers, it remitted the freight bills to the consignors of the shipments, and received credit for the full amount of the freight charges on the purchase price of the stone. It is then insisted that, while the plaintiff (purchaser) did physically pay the charges in the first instance to the carriers, it did not ultimately bear the freight charges, and consequently was and could not have been damaged. . . . It is clear the stone company makes no claim against the defendant (railway company). The consignee paid the rate found to be unreasonable. It was unlawfully required to pay such rate, and undoubtedly it suffered loss. . . . The stone was sold f. o. b. at the quarries. . . . Title to the stone passed to consignee when loaded on the cars at the quarries and was billed to consignee."

Insurance Problems Discussed

Unemployment Insurance

Whether we like it or not, manufacturers and material producers are being forced to become socially minded about insurance. We read, vaguely, of how Germany has unemployment insurance, England the dole, and of Russia's care of the aged. By contrast, we recall how satisfactorily private insurance companies have kept pace with the needs of American business and can hardly realize that radical forces are at work in our legislatures trying to Europeanize our insurance at the expense of industry.

The broad field of social insurance (or insurance for workers) includes coverage against premature death, old age and loss of income through illness or unemployment. In the United States we cover important elements of these risks through the following forms of insurance: group life, industrial life, pension, group health and workmen's compensation. Note that ordinary life, which is probably the biggest business in the world, is not included in this list. Ordinary life insurance is owned almost entirely by men of the middle and upper classes and, being economically administered, it is not much of a subject for radical politicians.

The list of coverages in the preceding paragraph includes the entire social insurance field except unemployment insurance. Of course, very few corporations carry all these lines. But the fact is they are available, and a study of them will indicate the trend of thought of American business men with respect to their obligations to employees.

Other Countries

It is possible to give either too little or too much attention to what is going on in other countries. Russia is undertaking to support all its aged and unfit at government expense. Germany has an elaborate state-insurance schedule, much of it compulsory, which must be supoprted by industry. The English dole, in principle a combination of charity and unemployment insurance, is financed by taxes, which practically means by business. We cannot shut our eyes and say that all this is three thousand miles away from us. Ideas do cross the Atlantic Ocean. Even bad ideas do. Each new social theory in a big European country does affect our thoughts in some way.

Effect on America

On the other hand it is unlikely that any of these foreign institutions will be transplanted to the United States. It is not practical to believe that any Russian or German system could be "put over" on us. We should keep our eyes open for news of the European experiments only because they influence our ideals. Then we should examine the American system of social insurance to see if it needs further development.

The following paragraphs will sketch some essentials of American insurance for the purposes of (1) seeing whether you should look into any of these lines for your own plant, (2) whether you would want our legislators to broaden employee insurance, and (3) whether the insurance companies themselves can improve their coverage.

Workmen's compensation insurance does not need emphasis at this time. Practically every producer carries it because it protects him against his most important legal liability. If you will look at workmen's compensation from the standpoint of the employee, however, you will see that it is merely one aspect of income insurance in which the premium has been "hung on" the boss and whereby, through political influence, the trade unions are constantly working on legislators to broaden the benefits and thereby increase the cost.

Group insurance, both life and health, is the subject which deserves your attention first in this field. It is distinctly practical. It fits the small organization as well as the large. It tends to hold men on the job because they suffer a loss if they leave your employ. It builds good will because you offer them sound insurance much cheaper than they can buy it individually. Group insurance is a good "buy" for both employer and workers. If it were adopted more universally by business men, half the agitation for state social insurance would be unnecessary.

Unemployment and Pensions

The two points of attack of the radicals are old-age pensions and unemployment insurance. The agitation over these has been increased largely by the recent business depression, but probably some of the agitation will carry over into better times as a permanent legislative program. These two coverages are unlike any other kind of insurance. Fire, automobile, ordinary life—all the forms of indemnity you can think of—cover accidents that are beyond the control of the insured. The American ideal says, "Insure what you cannot avoid, but not anything within your own control." Now old age is inevitable and unemployment is periodically probable according to our business cycles. There is no inherent need for insurance against something which is practically certain to happen. The natural cure for pensions and unemployment is that every worker should voluntarily put aside something for a rainy day and thus be able to finance himself while not working.

Thrift or State Aid

The whole question comes down to whether you insist that men should be stimulated to be thrifty and independent, or whether you believe that the majority of workers are so weak-willed that they can never be expected to save adequately. If you believe in independence, then you will, of course, be opposed to any compulsory insurance along these lines. If, however, you feel that American workmen will never take care of themselves, then you must decide whether you prefer private insurance or government insurance.

This discussion is a "live" issue at present. Pension policies may be purchased from certain big life-insurance companies, and a few state legislatures are considering compulsory laws on the subject. It is therefore important for business men to have a studied opinion on this subject, because the cost will come down on them.

Missouri Compensation Insurance Rates Raised

Rates for workmen's compensation insurance in Missouri in some of our industries will be increased for 1931. The change is due to the individual accident records of the businesses involved, because the general scale of rates in Missouri is about the same as in 1930. The changes are:

	1930 Rate	1931 Rate
Quarrymen, crushed-stone..	$7.76	$9.07
Quarrymen, building	6.56	9.01
Sand and gravel workers...	4.69	6.68

New Publications Tell of Aggregates Research

Three recent publications by the National Sand & Gravel Assn. are filled with information that should be read by all producers and consumers of aggregates. These may be had without charge by addressing the Engineering and Research Division of the association at 545 Munsey Bldg., Washington, D. C.

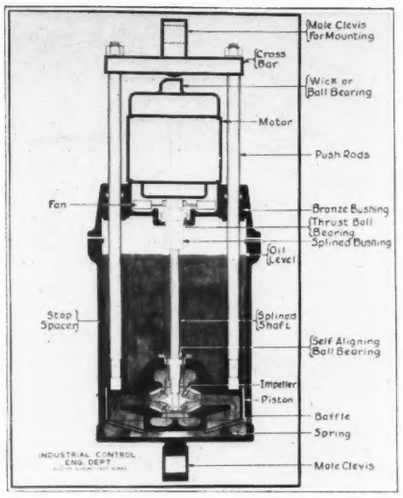
Circular 6, by W. J. Emmons, is entitled "Effect of Soft Particles of Coarse Aggregate on Strength of Concrete." This was published in condensed form in PIT AND QUARRY, June 18, 1930 issue. Circular 7, by Stanton Walker, covers the "Effect of Addition of Finer Sizes to Gravel on Strength of Concrete." Circular 8, also by Stanton Walker, on the "Effect of Grading of Gravel and Sand on Voids and Weights," was reprinted in the Nov. 19, 1930, issue of PIT AND QUARRY, while two appendixes in this circular appeared in the Dec. 3 issue.

New Machinery and Supplies

New Safety Device for Application on Hoists

The device consisting of a piston which will exert a smooth, straight-line thrust in one direction through a definite distance is shown in the accompanying drawing. This is accomplished by driving a small pump impeller by means of a fractional horsepower motor, which creates oil pressure under the piston and forces it up. As long as the motor runs, the piston is held at the top of its stroke. When power is interrupted to the little motor, the piston returns to the bottom of the stroke. This device, known as an electro-hydraulic operator, is being manufactured by the General Electric Co., and is working successfully on many industrial applications such as opening and closing the die on die casting machines, throwing clutch levers, raising and lowering ore chutes, and furnace doors, moving swinging saws and operating brakes.

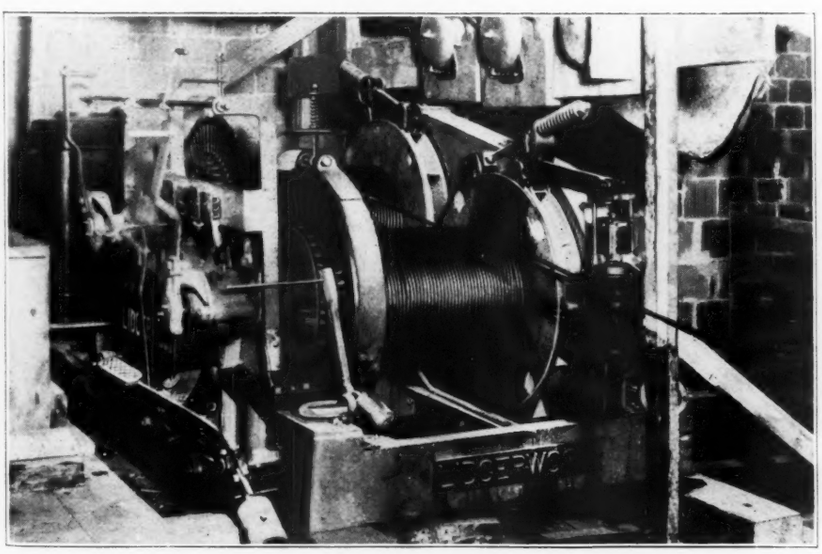
The photograph shows a double-drum Lidgerwood hoist such as is used in quarry operations for raising granite blocks from the quarry floor. The electro-hydraulic operator is used for releasing the emergency brake. When the hoist man starts the hoist, he depresses one of the foot levers controlling the service brake on one of the drums. This foot lever trips the limit switch and causes the fractional-horsepower motor on the electro-hydraulic operator to start and release the emergency brake. As long as the operating engineer's foot holds the service pedal down, the emergency brake stays released but if, for any reason, he abandons the hoist or power fails on the electric power system, or



Diagrammatic view of the operator.

if a fuse should blow, then the emergency brake will set quickly and smoothly and keep the load from falling. It will be noted that the releasing and the setting of the emergency brake always takes place automatically while the operating engineer is going through his usual routine in handling levers and service brakes for hoisting and lowering loads.

For the hoist illustrated there are two hand-operated switches, one for each drum. Opening either of these switches makes its corresponding drum inoperative and it it impossible to release the powerful emergency brake until this control switch is closed. This switch need not be opened unless the hoist is to be left idle for some considerable time. The action of the emergency brake in setting is very smooth and there is no sudden impact such as is characteristic of some types of brakes. The action of the helical spring in setting the emergency brake is controlled to a certain extent by the "dash-pot" action of the piston as it returns to the bottom of the cylinder. Before the piston can reach the bottom of the cylinder, the oil must pass through orifices in the piston from the lower to the upper chamber. This velvet grip of the emergency brake is essential to the successful application of the safety-first principle because, if the brake should be suddenly clamped on with a runaway load, it would be likely to snap the hoist cable or a derrick guy.



A double-drum hoist equipped with the electro-hydraulic operator.

Develops Motor Trucks Employing Dual Engines

The increasing use of heavy-duty motor trucks in building construction and excavating operations and in hauling huge quantities of materials has been a tremendous factor in increasing the speed and efficiency of the construction industry. Yet the need of increasing the load capacity per truck, of lowering the operating cost and adding to the speed of transportation, is an important problem.

A new type of truck introducing the multi-motor principle for the first time as a means of developing power, hauling capacity, and speed hitherto considered impossible offers a solution. The new truck, just announced by the Relay Motors Corp. of Lima, O., is a dual-engine, six-wheel, heavy-duty model. So powerful is the new model that double loads in excavation or building construction jobs, a capacity of 4 to 6 cu. yd. of wet mixed concrete, or 5,000 to 10,000 bricks or tile, in a single load are possible.

Driven by two huge engines, the new model, according to its designers, is the most powerful truck ever built. It will carry bigger loads than have ever been possible before in truck transportation with greater protection to the highway over which it travels. It will be the fastest heavy-duty truck in existence.

The new truck is equipped with two straight eight-cylinder-truck type engines with a combined power of 275 brake horsepower at 2,800 r.p.m. The power is applied to the drive in a radically new way, never attempted before. Each engine delivers power to a separate Relay rear axle. This idea of having two separate rear driving axles is entirely new in truck construction and overcomes many of the difficulties encountered in the operation of other six-wheel trucks. The problem hitherto has been in delivering the power from the engine to the

The dual-drive twin-engine truck.

rear wheels. In models with only one engine, the drive has had to be transmitted through the first rear axle to the one behind. Any irregularity in the first will affect the other. If one of the wheels on the first rear axle rolls over a bump or into a hole, or if one of the tires is under-inflated or partly worn, it causes a strain on the second rear axle. This has resulted in losses of power and efficiency, of unnecessary strains on one or the other axles and an earlier wearing out of the parts. In the new dual-motor model with each engine driving one rear axle independently via a separate transmission and differential, there is no chance for "fighting" between the rear axles, no loss of power or strain. Each operates as an independent unit.

The engines may be used in combination, or one at a time. Each engine has its own transmission. An air mechanism shifts the twin transmissions in perfectly synchronized time. This might be termed a "fool proof" feature, since it eliminates entirely the human element where the driver is concerned and insures the twin shiftings in exact mechanical harmony. One lever will shift both gears when both engines are in use. Two simple movements from the driver's seat connect or disconnect either engine.

Safety and quick stopping facilities have been provided by its builders. The new model is equipped with heavy-duty air brakes, with cast brake drums and moulded brake blocks on all six wheels, and air connections for trailers. Twin emergency brakes offer an added margin of safety in stopping.

Improved riding qualities, saving on tires, and better distribution of the load are possible in the new model because of the Relay axle. This Relay principle which suspends the load like a pendulum, allowing it to swing back and forth, greatly reduces horizontal impacts on all the rear wheels. It is an important factor in protecting the roads over which the truck travels.

Introduces Sheet Drier for Blue Prints, Photos

The new sheet drier, manufactured by the C. F. Pease Co., Chicago, Ill., is an inexpensive drier for moderate size blue-prints, negatives, blue-line and brown-line prints up to 24 in. wide. Also, when a chromium-plated cylinder is used, it is particularly adapted for drying photo prints, and is a fitting companion to either the Pease blue-printing machines, photostat machines, or rectigraph machines.

The new Junior sheet drier, as illustrated, closely resembles the larger size driers, both in design and construction. It is simple to operate, economical to maintain and, with proper heat regulation, produces thoroughly-dried prints, smooth and free from wrinkles, just a few moments after they are printed and washed.

New, inexpensive sheet drier.

Prints are fed into the drier over a brass scraper rod and up an inclined feed table which drains the water away from the drying drum and prevents steam pockets and creased prints. All surplus water is collected in an adjustable drip pan with drain plug located directly beneath the feed table and this pan can be raised or lowered as required for handling either long or short prints. After drying, prints are automatically returned into an adjustable tray at the front of the machine and when especially long prints are being run, the tray can be pushed back out of the way.

The revolving copper drying drum can be furnished with either gas or electric heating elements; also, chromium plated when so specified. Chromium plating is especially recommended for use in connection with drying photo prints as the drum can be easily cleaned with a damp cloth and will not be affected by chemicals.

New Motor Truck Device Reduces Unloading Time

With truck manufacturers concerning themselves with obtaining higher road speed, the Griswold Powermatic Corp. of Detroit has attacked the trucking problem from the angle of greater delivery speed.

The Powermatic unit increases truck efficiency by reducing loading and unloading time. The unit operates directly from a conventional transmission power take-off without any necessity of the driver leaving his seat. It is capable of loading 5 tons and will unload 7 tons with ease. It is adaptable to all makes of trucks. Quick-acting jacks at the rear of the truck frame relieve the truck axle of all unloading strains.

The Powermatic installation includes the power unit with gears running in oil, the long tool-steel worm carried on frictionless thrust bearings, and the threaded cross head that actuates the body-tilting mechanism. Massive I-beams, carried on liberal sized rollers at the rear of the truck frame, take the place of the conventional body sills. To these I-beams the tilting mechanism is connected.

To operate, a lever in the truck cab is moved to engage the power unit. The idling truck engine furnishes ample power for practically all loads. Smoothly the body moves backward. As this movement continues, the rear edge of the truck body is lowered slowly to the ground while the front is elevated. As the load touches the ground—or loading dock—the truck is slowly driven a short distance forward.

The unloading body after depositing a load of sacked cement.

Portable crusher being driven from tractor engine.

Presents Portable Type of Rugged Jaw Crusher

A new model of portable crusher is presented by the Day Pulverizer Co., Inc., Knoxville, Tenn. It is of the Dodge jaw type, simple in design and rugged. The upper end of the movable jaw surrounds an eccentric on the shaft in such a way that the revolution of the shaft not only swings the jaw forward but downward on the crushing stroke, thereby creating what its makers term a forced discharge.

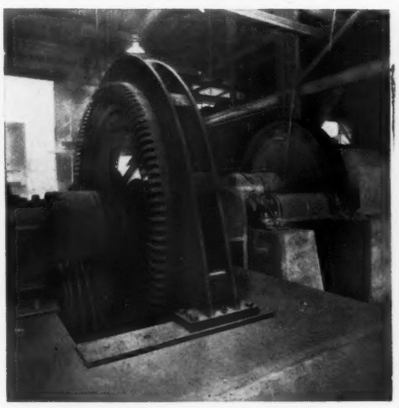
It is made in one size only—9-in. by 16-in.—runs at 275 r.p.m., and is mounted upon Caterpillar Tractors exclusively, it being suitable for use with any Fifteen, Twenty or Thirty model that has a rear power take-off. In the accompanying picture, one of these machines is shown reducing rocks that have been dumped alongside a road. Note the hopper for spreading the stone at the rear and the dirt surface in front of the tractor. Hinged legs support the crusher trailer when not attached to the tractor, these legs folding up during usual operation. The crusher receives its power, through a chain drive, from the power take-off of the tractor. Rock is fed from the side of the machine.

New Synchronous Motor for Starting Under Load

In addition to its high efficiency and excellent power-factor characteristics, the adaptability of the salient-pole synchronous motor to certain low-speed drives, which in many industries represent a major portion of the total plant load, has long since established it as the most desirable type of motor for these drives. However, the driven machines often must be started under load; and, heretofore, the chief objection to the synchronous motor has been its inability to develop the necessary starting and pull-in torques without incurring excessive current inrush or the use of an intermediate mechanical starting device.

To fulfill the need for a highly-efficient and mechanically-simple salient-pole synchronous motor providing the necessary starting and accelerating characteristics, the Westinghouse Electric & Manufacturing Co. has developed a motor known as the Simplex. This motor has starting and accelerating characteristics similar to a wound-rotor induction motor, which have been obtained without sacrificing the desirable running performance inherent in salient-pole synchronous motors. Both the motor and its controller are designed for operation in extremely dusty locations.

The ordinary cage-type damper winding in the pole heads is replaced with a phase-connected damper winding. The ends of this winding are brought out to slip rings permitting the use of a variable external-starting resistor similar to that used with a wound-rotor induction motor. This resistor is automatically cut out, in steps, by the controller, and when synchronous speed is approached the direct-current excitation is applied and the motor synchronized. This motor, unlike the synchronous-induction type, utilizes standard excitation voltages of 125 or 250 volts d.c. and requires low exciter capacity comparable to corresponding ratings of low torque design.



A 300-hp. synchronous motor driving tube-mill in a cement plant.

Several installations have been made during the past year. At one cement plant in New York state four 30-hp., 138-r.p.m. motors are driving tube mills and one 350-hp., 400-r.p.m. motor is driving a preliminary grinding mill.

Acquires Manufacturing Rights to Dipper Front

The American Manganese Steel Co., Chicago Heights, Ill., has been granted an exclusive license by Grover C. Voit of Hopedale, Ohio, to manufacture and sell the Voit dipper front, covered by U. S. patent 1,719,576.

This front, while of the general design used ordinarily on power-shovel dippers, has, as its distinctive feature, a provision for several scraper blades on the outside, one of them running

Manganese-steel dipper front.

transversely at the heel of the front, and two in a V-shaped arrangement farther toward the lip. There may be additionally a longitudinal one between the V-blades, still farther up.

The sockets holding the scraper blades are cast integrally with the front, and the blades are held in place by wedge-shaped parts riveted into the sockets alongside the scraper blades.

A factor of economy is the transverse scraper at the heel of the front, which protects the dipper latch from mud and similar material, allowing it to remain in perfect working condition and saving many dippers of earth during each shift.

While designed originally for stripping, the Voit front can give a uniform grade in street or road work, leaving a smooth, clean bottom to receive the paving material. It will also work well in cutting slopes in road building. Voit fronts in such work would require only the transverse scraper at the heel of the front.

Manufacturers' Publications

Each publication listed below contains information of interest to non-metallic mineral producers. Readers may obtain, without charge—except where a price may be stated—and without obligation, copies of any of these publications by writing directly to the manufacturers who publish them. Please mention PIT AND QUARRY *when writing.*

Abrasives

"Grinding With Portable Type Machines." 4 p., 3 ill. *(Grits and Grinds,* for November, 1930. The Norton Co., Worcester, Mass.) An article describing numerous advantages of portable grinders and their use about industrial plants.

Burning and Generating

Fuel-Burning and Steam-Generating Equipment. 16 p. illustrated. (Catalogue GC-6. Combustion Engineering Corp., New York, N. Y.) Describes and illustrates the fuel-burning and steam-generating equipment manufactured by this corporation. A complete list of products is included.

Cars

"Haulage Equipment Reduced Over 50 Per Cent Through Installing S & D Automatic Drop-Bottom Cars." 4 p., 12 ill. *(Car-Sense and Non-Sense* for December, 1930. Sanford-Day Iron Works, Inc., Knoxville, Tenn.) Describes and illustrates the operations at the Eau Claire Sand & Gravel Co., Eau Claire, Wis., emphasizing particularly the economies effected by the use of automatic drop-bottom cars.

Drag-lines, Diesel

Page Diesel Engines and Diesel-Powered Draglines. 24 p., 19 ill. (Bulletin 800A. Page Engineering Co., Chicago, Ill.) Describes and illustrates large Diesel-operated walking drag-lines. Engines have a range of from 100 to 450 available horsepower.

Drill Steel

Swede Steel. 16 p., 26 ill. (Paragon Steel & Tool Co., East Rutherford, N. J.) Describes and illustrates hollow and solid drill steel in standard lengths and cross-section. Other tool steels also listed and described.

Excavators

The Wiley Whirley. 20 p., 33 ill. (The Dayton Whirley Co., Dayton, O.) Describes and illustrates a steel derrick for clamshell, dragline and hoisting work. Recent changes in design are discussed.

Locomotives, Gasoline

Brookville Locomotives. 12 p., 26 ill. (Bulletin B-27. Brookville Locomotive Co., Brookville, Pa.) Describes and illustrates a line of industrial locomotives powered by McCormick-Deering gasoline engines in sizes ranging from 4 to 12 tons. Helpful tables for choosing the proper size and type of locomotive are included.

Power-Plant Equipment

Steam Turbines. 12 p., 13 ill. (Bulletin GEA-1080A. General Electric Co., Schenectady, N. Y.) Describes and illustrates steam turbines and turbo-generators, showing construction details and a chart of steam flow through turbine vanes.

Pulverizers

The New Fuller Lehigh Type B Pulverizer. 4 p., 3 ill. (Bulletin 5-80. Fuller Lehigh Co., Fullerton, Pa.) Describes and illustrates the construction and operation of a new pulverizing mill. Outstanding features include the spherical-ball and grinding-ring principle of pulverizing in which fineness is not affected by wear of grinding parts, and the inclosure of all parts requiring lubrication in dust-and-oil tight housings apart from the grinding zone.

Pumps

Humphryes Pumps. (The Humphryes Manufacturing Co., Mansfield, O.) A series of circulars describing and illustrating a line of portable pumps, including both diaphragm and centrifugal types.

Worthington Deep Well Pumps. 32 p., 63 ill. (Bulletin D450-B1a. Worthington Pump & Machinery Corp., Harrison, N. J.) A new bulletin describing and illustrating three types of Worthington pumps for deep-well and sump service. Operating diagram and actual installation views are shown.

Scrapers

"Stripping a Hillside Quarry." 4 p., 6 ill. "Modern All-Steel Gravel Plant." 4 p., 4 ill. *(Sauerman News* for Nov.-Dec., 1930. Sauerman Bros., Inc., Chicago, Ill.) Two short articles describing the part played by power-drag scrapers in crushed-stone and sand-and-gravel production.

Screens, Vibrating

Do You Know About the Summit Screen? 4 p., 3 ill. (J. S. Morrison Co., Inc., Pittsburgh, Pa.) Describes and illustrates the salient features of a new vibrating screen with frame-mounted motor, anti-friction bearings and pressure lubricating system.

Snow Removal

La Plant-Choate Snow Plows. 44 p. Illustrated. (La Plant-Choate Manufacturing Co., Cedar Rapids, Ia.) Describes and illustrates a complete line of blade-plow-equipped tractors for removing snow from roads, industrial driveways and other areas. Specifications also included.

Tractors

Traction for Action. 24 p. Illustrated. (Caterpillar Tractor Co., Peoria, Ill.) A picture booklet of interesting applications of this popular crawler-mounted tractor. Some excellent photographs depict clearly the added traction obtained by the use of the caterpillar treads.

Recent Books Reviewed

Elementary Economic Geology, by Heinrich Ries, A. M., Ph.D., professor of Geology at Cornell University. John Wiley & Sons, Inc., New York, N. Y., price $3.75. This work is a condensation of the material contained in a much larger volume entitled Economic Geology. It is brought up to 1930 in its presentation of economic products. While intended as a one-term college textbook, it is written in simple language that can be appreciated by anybody who is interested in minerals. The book comprises two parts, one on non-metallics (163 pages), the other on ore deposits (154 pages). The latest available statistics from the U. S. Bureau of Mines and the Canadian Bureau of Statistics have been drawn upon freely.

Higher Arithmetic by Frederick A. Smith, C. E. Published by the author, 608 S. Dearborn St., Chicago, Ill. Price $2, postpaid. The claim is made that this is the only textbook that has developed these short methods of multiplication, division and the extraction of roots. These time-savers should be mastered by all mechanics or engineers who are required to make computations. Most of these men use slide rules for such work but their results often lack the exact details which arithmetic affords. Logarithms are cumbersome. Mr. Smith speaks from forty-five years of engineering experience. He presents simple ways of computing arithmetically with a saving of about 55 per cent of the time and space required with the orthodox methods as taught in schools.

St. Peter and Older Ordovician Sandstones of Northern Arkansas, by Albert W. Giles and E. E. Bonewits. Bulletin 4, Arkansas Geological Survey. Price $1.95, by insured mail. This book of 203 pages, 13 plates and 22 figures discusses the geology, distribution, physical characteristics and economic possibilities of three series of sandstones. It describes the technical practices followed in the investigations covering size of grains, fineness modulus, percentage of fineness, effective size, shapes of grains, degree of angularity, soundness of grains, absorption of water, voids, pitting of grains, secondary enlargement of grains, frosting, specific gravity, refractoriness, analyses, and cementation. The sands are discussed with regard to their commercial importance in making glass and as materials for filtering, paving, building, heat-resisting, abrasives, chemical and metallurgical, filler and absorbent purposes.

Safe Practices to Be Employed When Opening Dynamite Cases

When only two or three dynamite cases are to be opened at a time, safety is the prime consideration, but when hundreds of cases must be opened, as for a large quarry shot, the ease and quickness with which the work can be done become important also, according to R. H. Summer, technical representative, E. I. du Pont de Nemours & Co., Inc.

Whether one case is to be opened or a thousand cases, safety demands the use of wooden tools without any metal whatever about them. A steel chisel or an iron sledge hammer or even a copper wedge may strike a spark from the nails that may cause the dynamite to explode. While it is true that many dynamite cases are

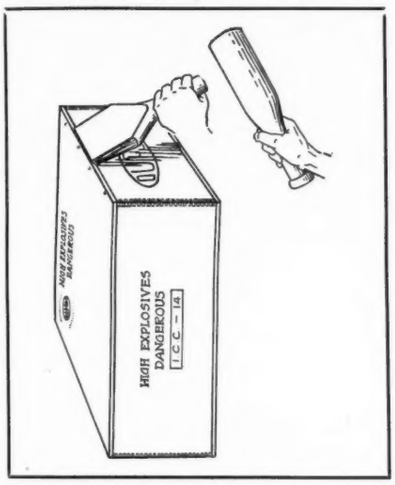


Fig. 1. One safe way of opening a dynamite case—prying the lid off with a wooden wedge and dolly.

opened every year by means of metal tools without accident, it is likewise true that the hazard is always present. Any workman who uses a metal tool for this purpose is exposing himself to possible injury or death. Wooden tools do away with this hazard and they are just as effective. It takes a little forethought, perhaps, to have them at hand when needed, but the prevention of accidents is worth some effort. Any wooden wedge and mallet will serve. Fig. 1 shows a dolly and a wedge with a handle which are provided at one large operation for opening all dynamite cases.

Figs. 2, 3, 4 and 5 show a method

Fig. 2. In another safe method one sharp blow is struck on one corner at the third dovetail from the top.

Fig. 3. Next, a second blow is struck on the opposite corner in the same position.

of opening dynamite cases which combines several safety advantages with ease and quickness. The implements needed are a sharp hard-wood wedge and a mallet. The procedure is as follows:

First, stand the box on end, place the edge of the wedge on one corner at the third dovetail from the top and strike the head of the wedge a sharp blow with the mallet. This will start a split in the box from this corner, as shown in Fig. 2. Next, repeat the operation on the opposite corner of the

Fig. 4. These two blows carry a split around the box a few inches from the top.

Fig. 5. A slight pull then removes the top of the box intact.

same end, as shown in Fig. 3. This will usually carry the split around the box so that a slight pull will remove the lid intact, with the strips of the sides and ends containing the nails attached, as in Figs. 4 and 5.

The success of this method of opening cases depends somewhat on the straightness of grain in the wood of the case but ordinarily the top will split off clean with very little splintering and when a workman gets the knack, it is much faster than other safe methods. Of course, the box is spoiled for some future purposes but there is still plenty of it left for carrying stemming material, which is the chief use to which empty boxes are put. For this last purpose, it is much safer to have no protruding or bent-over nails around the edge of the box.

Opening cases in this way lessens the work of clearing away the tops and reduces the hazard that workmen will be injured by handling splintered boards or stepping on boards with nails in them.

Motion Picture Depicts Making of Refractories

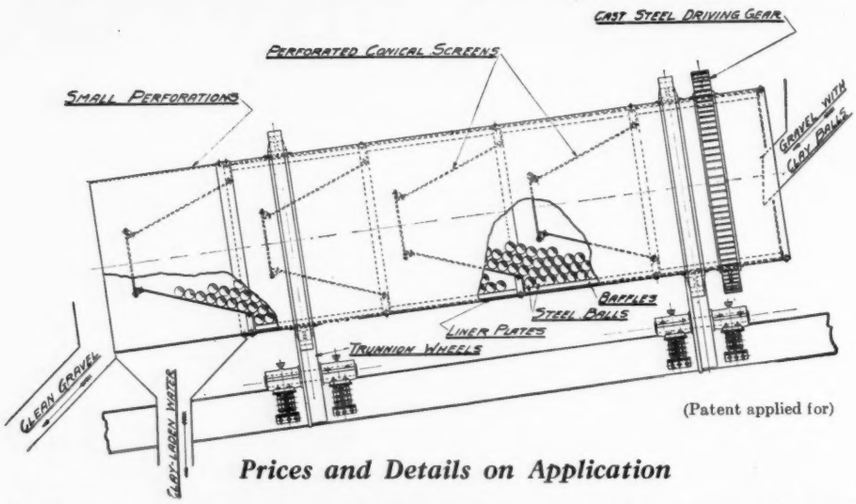
The Harbison-Walker Refractories Co., Pittsburgh, has just completed a 5000-ft. motion picture illustrating modern methods employed in the manufacture of refractories. The film shows every step in the production of refractories from the mining of raw materials to the loading and shipping of the finished product. Scenes in the research and control laboratories and some interesting animated photography showing the action of periodic and continuous tunnel kilns are also included in the picture.

This Harbison-Walker film, perhaps the most complete story of refractories ever made for the screen, is available without cost to technical societies, engineering organizations, industrial organizations, universities, colleges, technical schools and research laboratories. It is suggested that early applications be made to Harbison-Walker Refractories Co., Pittsburgh.

CLAY BALLS ⟍ SOFT STONE

Positively removed in large quantities by the

ALLSWEDE SCRUBBER



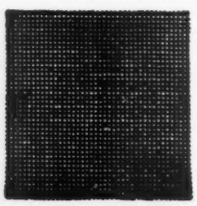
(Patent applied for)

Prices and Details on Application

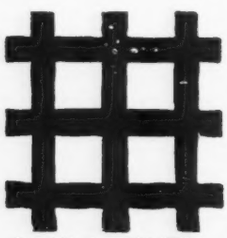
See the working model of the ALLSWEDE SCRUBBER at the National Crushed Stone Convention and the National Sand and Gravel Producers' Convention in St. Louis this month

F. M. WELCH ENGINEERING SERVICE, Inc.

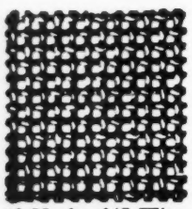
GREENVILLE, OHIO



40 Mesh; .0135 Wire



2½ Mesh; .105 Wire



12 Mesh; .047 Wire

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